TECHNOLOGY DEPT.

THE INSTITUTE OF PETROLEUM REVIEW

#92

August 1954

PUBLIC LIBRARY
SEP 4 1954
DETROIT

ONE SHILLING AND SIXPENCE

Published by The Institute of Petroleum
26 Portland Place, London, W.1

Oil is our way of life

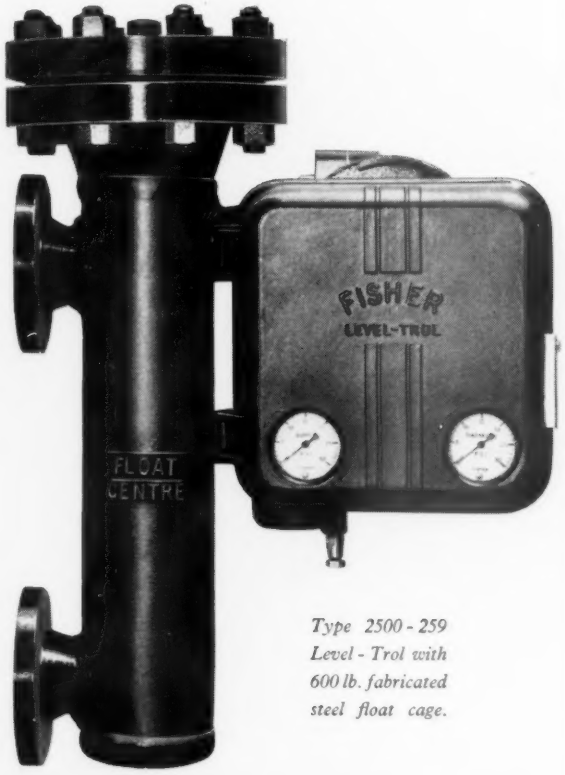
The Rev. Sydney Smith confessed that his idea of heaven was eating *pâté de foie gras* to the sound of trumpets. You yourself may be a vegetarian, and not like music with your meals. You will have your own conception of a pinnacle of happiness, a flashpoint of Better Living.

It is not for the modern Petroleum Industry to interrupt your dreams. Oil is content to go on multiplying the basic amenities of your life on this earth. It makes your transport quick and safe; it speeds the plough; it lubricates the machines of factories. Oil provides ingredients for new drugs, new materials for the modern synthetic fabrics. And oil helps in your home, too. It provides an essential ingredient for the washing powder that your wife uses. The linoleum on her kitchen floor, the fluid in which she preserves her eggs, her rubberised apron and gloves, the plastic curtains in her bathroom, even the nail-varnish on her dressing table . . . . Petroleum chemicals have been at work in their manufacture; which probably accounts for their high quality and low price. The name of SHELL may not be on them, but Shell Research stands behind them.

Petroleum in its crude form, dredged from the desert, marsh and jungle, is an unfriendly looking substance, dark, often sticky, sometimes smelly. But the products of its refinement oil the wheels of life: cleanly, smoothly and increasingly.

SHELL **research points the way**

FISHER
Level Control



Type 2500 - 259 Level - Trol with 600 lb. fabricated steel float cage.

FISHER LEVEL-TROL

...the accepted standard

for a liquid level controller that is high in sensitivity and accuracy, versatile in handling all kinds of liquids, ruggedly built, easy to operate and simple to maintain.

Write for full information

FISHER GOVERNOR COMPANY LIMITED

CENTURY WORKS, LEWISHAM, LONDON, S.E.13. • TIDEWAY 3232

THE INSTITUTE OF PETROLEUM REVIEW

Hon. Editor: E. B. EVANS, M.Sc., PH.D., F.R.I.C.

Hon. Associate Editor: D. L. SAMUEL, B.Sc., A.R.I.C.

Editor: GEORGE SELL

Vol. 8, No. 92 **August 1954**

Contents

PETROLEUM TAXATION—DILEMMA OR CHALLENGE? . . . 153

PETROLEUM IN PARLIAMENT 158

THE HONORARY EDITOR—PROFESSOR F. H. GARNER—RETIRES 159

COUNCIL COMMENTARY 160

AROUND THE BRANCHES 161

BOOKS 162

CAPITAL CONTROL OF WORLD PRODUCTION 163

TRADE LITERATURE ETC. 164

OCEAN TRANSPORT 165
By *E. H. Thompson*

PERSONAL NOTES 169

NOTES OF THE MONTH 170

Price 1/6 **Annual Subscription 15/-, post free**

Published monthly by

THE INSTITUTE OF PETROLEUM

26 Portland Place, London, W.1

'Phone: LANgham 2250

Printed by
Richmond Hill Printing Works Ltd., Bournemouth

Mr Truck Buyer

HAVE YOU AN

EXPORT PROBLEM?

Built on the famous Thames 'Sussex' chassis, this 1,450 gallon Kerosene Tanker body built by W. B. Bawn Ltd. conforms to all Export requirements and is available through

FORD MOTOR COMPANY LIMITED.

IF SO WE CAN HELP YOU

Write or 'phone

EXPORT DIVISION

FORD MOTOR COMPANY LIMITED
DAGENHAM · ESSEX

RAINHAM 3000 extension 45

PARANOX 448

a new and improved Rust Inhibitor Additive

Paranox 448 developed in the Esso Laboratories is now available in this country.
Added to turbine, transformer and other industrial circulating oils, Paranox 448 effectively controls the rusting of metal parts operating in the presence of water or sea water.
Our Technical Representative will be glad to call and give you full details of how Paranox 448 and other Paramins can meet your specific lubrication problems. This service places you under no obligation whatsoever.

PARAMINS TRADE MARK

Paraflow PDX Pour Point Depressant, Paratone Viscosity Index Improver, Paranox Range of Detergent Inhibitors, Paratac Stringiness Agent, Vistone B Oiliness Agent, Paradyne Fuel Improvers.

ESSO PETROLEUM COMPANY, LTD., 36 QUEEN ANNE'S GATE, LONDON, S.W.1

CORROSION PROBLEMS

in Reaction Chambers, Bubble Towers, Vapourizers, Cracker Drums, Receiver Drums, Vacuum Towers, Fractioning Towers, Flash Columns and Tanks

AND

INSULATING PROBLEMS

in Steel Stacks, Flues and Heat Exchangers

ARE MASTERED QUICKLY

by the application of Aluminous Cement and Small Aggregate, carried safely, securely and economically

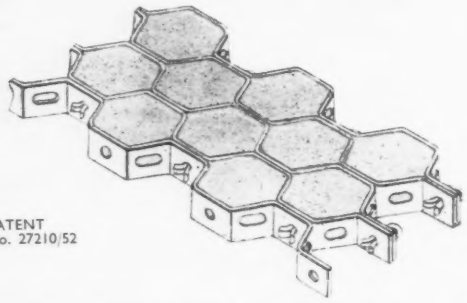
BY

"CAUSEWAY"

CEMENT FILLED

CELLULAR REINFORCEMENT LININGS

THE SURFACE TO SURFACE REINFORCEMENT

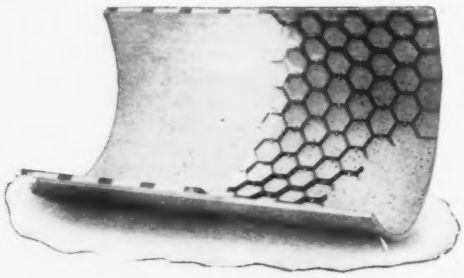


PATENT
No. 27210/52

Note the Slotted Side Walls and Keying Devices which ensure complete immunity against dislodgement of the cement even under the most severe conditions. Several patented variations of the Keying methods are available to suit varying conditions.

Mats are made up in a Wide Range of Sizes, Hex Pitch or Depth, either rivetted as rigid members or having a flexibility to suit any radius from eight inches upwards.

A special Two Way Flexible construction is available for Domed Roofs and Flumed Channels.



Causeway Reinforcement Ltd.

66 VICTORIA STREET, LONDON S.W.1

TELEPHONE VICTORIA 8648 and 1873

The Post-War Expansion of the U.K. Petroleum Industry

Being the full report of the 1953 Summer Meeting of The Institute of Petroleum

220 pages Illustrated

Price **25s. 0d.** post free

Obtainable from

The Institute of Petroleum

26 Portland Place, London, W.1.

ADVERTISERS

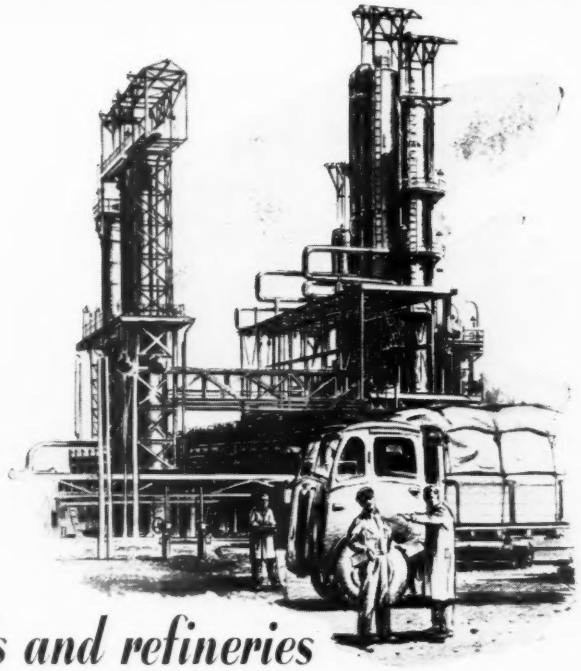
	PAGE
Alley & MacLellan Ltd	July
Anchor Chemical Co. Ltd	July
Anglo-Iranian Oil Co. Ltd	xiii
Audley Engineering Co. Ltd	xvi
E. B. Badger & Sons Ltd	*Inside back cover*
British Thomson-Houston Co. Ltd	v
Causeway Reinforcement Ltd	iv
Chemical & Insulating Co. Ltd	xiv
Consolidated Pneumatic Tool Co. Ltd	July
A. F. Craig & Co. Ltd	xvii
D. & C. and William Press Ltd	xv
Dunlop Rubber Co. Ltd	July
Elliott Bros (London) Ltd	July
English Electric Co. Ltd, The	June
Esso Petroleum Co. Ltd	iii
Evershed & Vignoles Ltd	vi
Finney Presses Ltd	Mar.
Fisher Governor Co. Ltd	i
Foamite Ltd	July
Ford Motor Co. Ltd	ii
W. J. Fraser & Co. Ltd	x
A. Gallenkamp & Co. Ltd	July
General Electric Co. Ltd, The	July
Matthew Hall & Co. Ltd	vii
Incandescent Heat Co. Ltd, The	July
Johnson & Phillips Ltd	July
Lake & Elliott Ltd	July
Liquids Control Ltd	July
London and Thames Haven Oil Wharves Ltd	viii
M. & C. Switchgear Ltd	July
A. & J. Main & Co. Ltd	xii
Manchester Oil Refinery (Sales) Ltd	May
Metal Containers Ltd	*Back cover*
Metal Propellers Ltd	July
Metropolitan-Vickers Electrical Co. Ltd	July
Monsanto Chemicals Ltd	July
National Benzole Co. Ltd	July
Petroleum Inventions Ltd	July
Piggott Bros. & Co. Ltd	xii
Regent Oil Co. Ltd	July
Rubery, Owen & Co. Ltd	xviii
Sankey-Sheldon Ltd	ix
Serck Tubes Ltd	xix
Shell-Mex and B.P. Ltd	xx
Shell Petroleum Co. Ltd, The	*Inside front cover*
Simmons & Hawker Ltd	July
Sydney Smith & Sons (Nottingham) Ltd	July
Peter Spence & Sons Ltd	xi
Stewarts and Lloyds Ltd	Apr.
Stothert & Pitt Ltd	July
Triangle Valve Co. Ltd	July
United Steel Companies Ltd, The	Apr.
Vacuum Oil Co. Ltd	June
C. C. Wakefield & Co. Ltd	June
Walsall Conduits Ltd	July
Woodfield Hoist and Associated Industries Ltd	July

Wheels of industry the world over are turned

by

B
T-H

ELECTRIC MOTORS



in oilfields and refineries

Whenever a power drive is needed, there is a BTH motor that will do the job efficiently and economically. In industries all over the world, BTH motors are helping to increase production. Over half-a-century's experience of this branch of electrical engineering enables BTH to offer the motor with the mounting, enclosure, rating and performance best suited to the application.

BTH factories are exceptionally well equipped to make both ***STANDARD*** *and* ***SPECIAL*** *machines in large quantities*

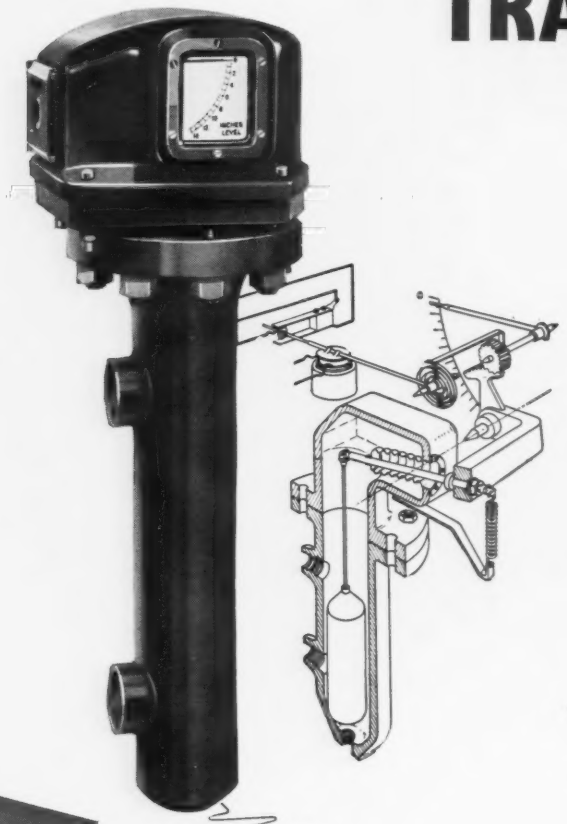
THE
BRITISH THOMSON-HOUSTON
COMPANY LIMITED, RUGBY, ENGLAND

Member of the AEI group of companies

A4704

EVERSHED

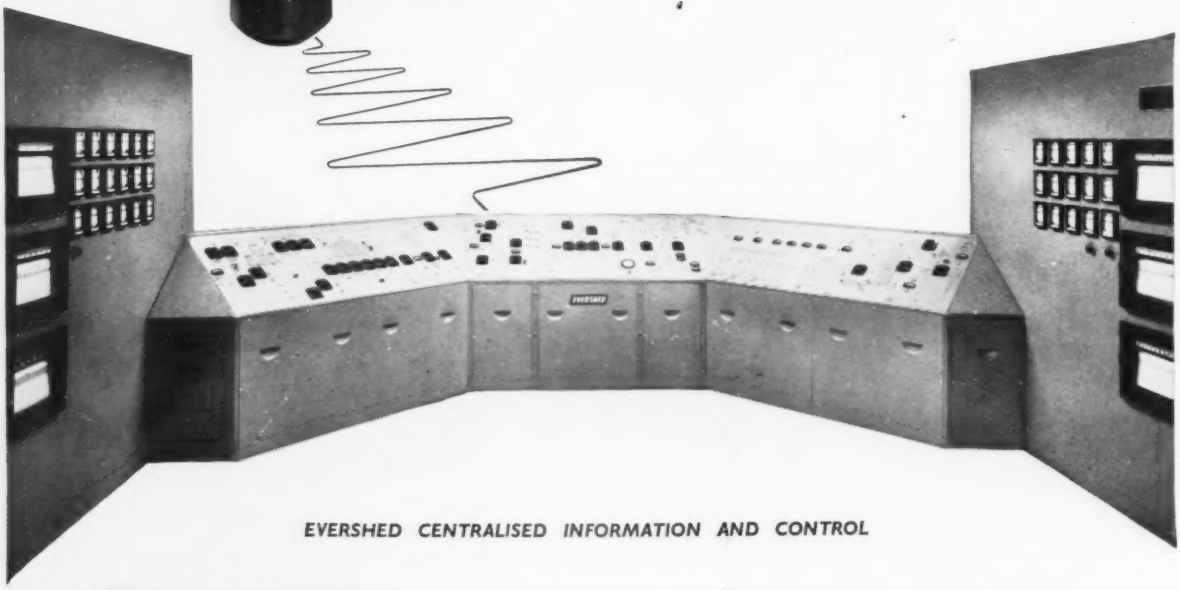
DISPLACER LEVEL TRANSMITTER



At the new Anglo-Iranian Refinery at Aden, flow, pressure, level and temperature in two 60,000 B.P.S.D. Crude Distillation Units are automatically controlled from two Central Control Desks.

Levels are controlled by means of the Evershed Displacer Level Transmitter. These transmitters are designed to detect the level of liquid, or the interface between two liquids in a pressure vessel, and to transmit the information to the required central point.

The instrument is sturdily built, reliable and intrinsically safe. *For full details of the Evershed Displacer Level Transmitter send for Publication PA* 266/1.



EVERSHED CENTRALISED INFORMATION AND CONTROL

EVERSHED

EVERSHED AND VIGNOLES LIMITED

ACTON LANE WORKS · CHISWICK · LONDON · W4

Telephone: Chiswick 3670 · Cables: Megger, London : Telegrams: Megger, Chisk, London

s/159

section of one of our design offices.

THE

MATTHEW HALL

GROUP OF COMPANIES

ESTD. 1848

MATTHEW HALL

OIL REFINERY ENGINEERS

- DESIGN . . . .
- PROCUREMENT . .
- CONSTRUCTION . .

THE MATTHEW HALL GROUP OF COMPANIES

MATTHEW HALL & CO., LTD. — MATTHEW HALL (PTY.) LTD.
KELCO (METALS) LTD. — GARCHEY LTD.

LONDON . . . . . Dorset Square, N.W.1	JOHANNESBURG 52, Commissioner Street	BELFAST . . . . . Greenwood Avenue
MANCHESTER . . . . . 14, Lloyd Street	GERMISTON . . . . . Wadeville	DUBLIN . . . . . 29, Westland Row
GLASGOW . . . . . Dykehead Street, E.2	DURBAN . . . . . 100-102, Williams Road	WEST INDIES . . . . . Kingston, Jamaica
BRISTOL . . . . . St. Stephen's Street	CAPE TOWN . . Epping Industrial Estate	BULAWAYO . . . . . Ironbridge Road
	WELKOM . . . . . Third Street	

1,000,000 tons of storage

London's oil reservoir for over 50 years

This great independent petroleum installation, serving the needs of all the oil companies operating in the country, both large and small, receives into its storage tanks petroleum products from many parts of the world. From there the oil goes out in a constant flow by water, road and rail to supply greater London and the neighbouring Counties.

LONDON AND THAMES HAVEN OIL WHARVES LIMITED

3 ST. HELENS PLACE, LONDON, EC3 · Tel: AVEnue 6444

THAMES HAVEN INSTALLATION · Tel: Stanford-Le-Hope 2232

This is UNISTRUT

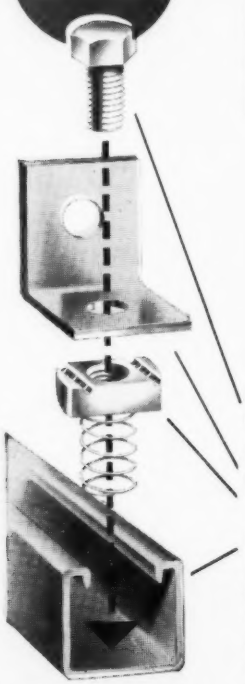
THE QUICKER EASIER WAY TO FRAME, HANG & SUPPORT ALL ELECTRICAL, PLUMBING, HEATING AND VENTILATING EQUIPMENT

COMPLETELY ADJUSTABLE• NO DRILLING• NO WELDING• NO DETAIL DRAWINGS REQUIRED• "UNISTRUT" SAVES TIME, LABOUR AND MONEY

HOW TO BUILD WITH UNISTRUT

"Unistrut" Channel with Continuous Slot
Wedge Shaped Inturned Edges to take Serrated Grooves of "Unistrut" Nut.
"Unistrut" Locking Nut with Serrated Grooves.
Serrated Grooves "Bite Into" Inturned Edges of Channel for Positive Location.
Insert Locking Nut anywhere Along Continuous slot of Channel . . .
Rounded edges of nut permit easy insertion Spring (your third hand) holds nut snugly in place for bolting.
Assemble Fitting, Nut and Bolt—a turn of the spanner, it's done

THE BASIC COMPONENTS



THE BASIC COMPONENTS

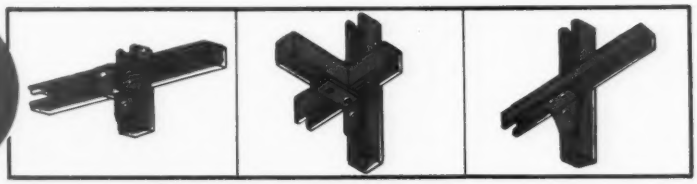
Unistrut Bolt
½" and ¼" sizes.

Unistrut Framing Fittings.

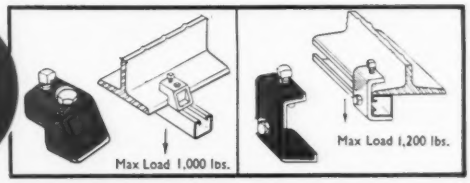
Unistrut Locking Nut.

Unistrut Channel 12 gauge 10'-0" and 20'-0" standard lengths.
Standard finish - Bonderized and stove enamelled olive green. Also available galvanized or plain, oil protected.

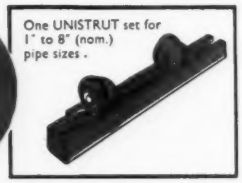
FRAMING FITTINGS



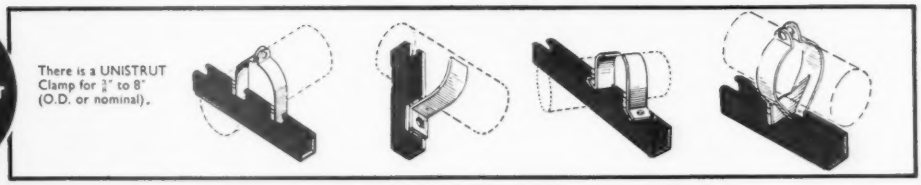
BEAM CLAMPS



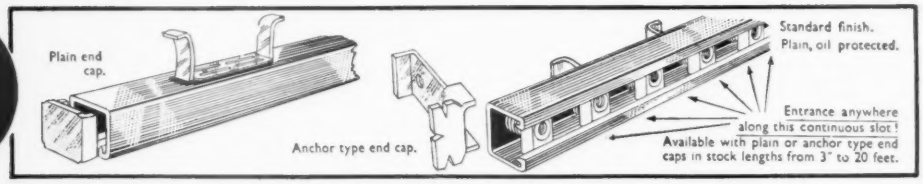
ROLLER PIPE SUPPORTS



CABLE PIPE AND CONDUIT CLAMPS



CONCRETE INSERTS


Plain end cap.
Anchor type end cap.
Standard finish. Plain, oil protected.
Entrance anywhere along this continuous slot!
Available with plain or anchor type end caps in stock lengths from 3" to 20 feet.

UNISTRUT IS AVAILABLE FROM ALL SANKEY-SHELDON BRANCHES

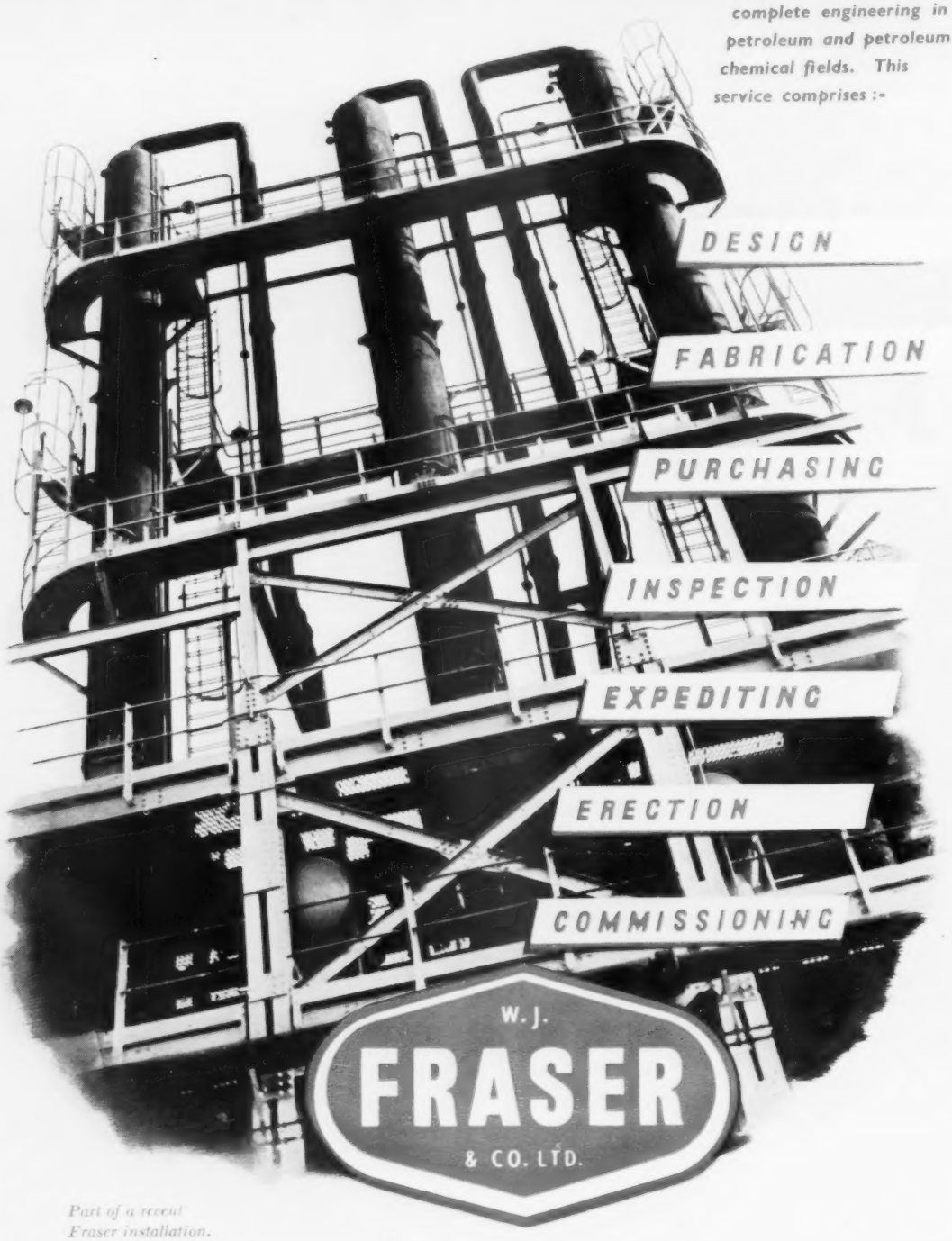
Send for complete catalogue today

UNISTRUT DIVISION OF

Sankey-Sheldon LTD

Dept. (UI PRI) 46, CANNON STREET, LONDON, E.C.4

FRASERS undertake complete engineering in the petroleum and petroleum chemical fields. This service comprises :-



Part of a recent Fraser installation.

W. J. FRASER & CO. LTD • HAROLD HILL • ROMFORD • ESSEX
WORKS: MONK BRETTON • BARNSLEY • S. YORKS.

TAS/FS414

Petroleum Taxation—Dilemma or Challenge?

A meeting of the Economics and Operations Group of the Institute, held on 4 May 1954 under the chairmanship of A. L. King, took the form of a symposium on taxation in which the speakers were M. E. Weinstein, W. S. Ault, and A. A. Appleton.

In an opening address the Chairman said: A great deal has been written and spoken in the U.K. on petroleum taxation, especially in recent years when the output of material has risen almost in ratio to the successive drastic increases in the tax itself.

What, however, in simple terms, is the petroleum taxation position in this country? Of the total receipts from the consumer of taxable motor and aviation fuels, 64 per cent goes to the Exchequer and 36 per cent is devoted to meeting the cost of exploration, drilling, production, refining, transportation, distribution, and marketing. Chart 1 (Customs and Excise Receipts 1954-1955) is a simple league table, showing where petroleum taxation stands in relation to other receipts from taxes on specific commodities. I am not going to attempt any observations on the nature of the other commodities which are associated with petroleum taxation at the top of the league table. Whether or not tobacco, beer, wines, and spirits in any way merit the term luxury, or whether, for that matter, petroleum products merit the term luxury, I must leave to your judgment.

In the light of this position, the Committee of the Group felt that there were certain aspects of the subject which merited examination in greater detail and, for the purpose of this discussion, has chosen first, the effect on the national economy in the U.K., secondly, the effect on motor vehicle and engine design, and thirdly, the effect on refinery operations. It does not necessarily follow, of course, that one can trace the most devastating effects in all of these fields.

Effect on the National Economy in the U.K.

M. E. Weinstein spoke first and said:

The French financial reformer, Colbert, laid down the maxim that: "The art of taxation consists in so plucking the goose as to obtain the largest amount of feathers with the least amount of hissing." I do not think that the Government or the public are today in any doubt as to the views which are widely held in industry in regard to the fuel tax. The cumulative ill-effects of the inflated costs which it causes are plainly visible and I can touch on only one or two aspects of a situation which is causing concern everywhere.

Charts 2, 3, and 4 set out the size and dimensions of transport operating costs in Great Britain and help to stress the fact that those who lay down rates of taxation appear to regard the motor vehicle as synonymous with the private car, and hold the private car to be an instrument of amusement which can be taxed with complete moral justification and without any harm to commercial or business activity. To-day, however, the amount spent on the operation of vehicles on the roads represents more than 10 per cent of the national income (here taken as gross domestic product at market prices). This is a clear indication of the widespread use of road transport and the far-reaching effects on the economy of the country of a penal level of taxation, which inflates industrial costs everywhere by raising the transport element in the price of all goods, whether used for manufacture, entering into home consumption, or being delivered to the ports for export. Side by side with this has gone the refusal of successive Governments to undertake any real system of road improvement which would ease the load on operating efficiency and give some return on the large sums of money levied on this one form of transport.

The particular alarm which is felt about today's position is that in a Budget which can be described, if I may borrow the phrase of another Frenchman, as of "unspeakable mediocrity", failure to reduce the rate of motor fuel taxation has withheld what would have been a real aid to industry in reducing industrial costs, at a time when world trade has entered a period of intense competition. The Government's Economic Survey has underlined the present need to reduce current costs and to stimulate a higher rate of capital investment in manufacturing industry. To reduce the fuel tax would be one of the best methods of cutting costs all round, for transport and distribution enter into all costs, and as will be seen from Chart 2, out of total transport expenditure road transport payments account for more than 70 per cent.

There is a very real danger that with motor taxation forcing up transport costs, British products, and engineering products in particular, will be priced out of foreign markets.

Effects on Road Passenger Transport

Apart from the effects which the high fuel tax has on industrial costs generally, it is having particularly harsh and discriminatory consequences for the road passenger transport industry. On an average, the tax of 2*s.* 6*d.* per gallon represents 3*d.* for every mile run by a bus and, as a tax on an industry's raw material, it is probably unparalleled. An equivalent tax on, for instance, coal for railway locomotives, would represent about £25 per ton.

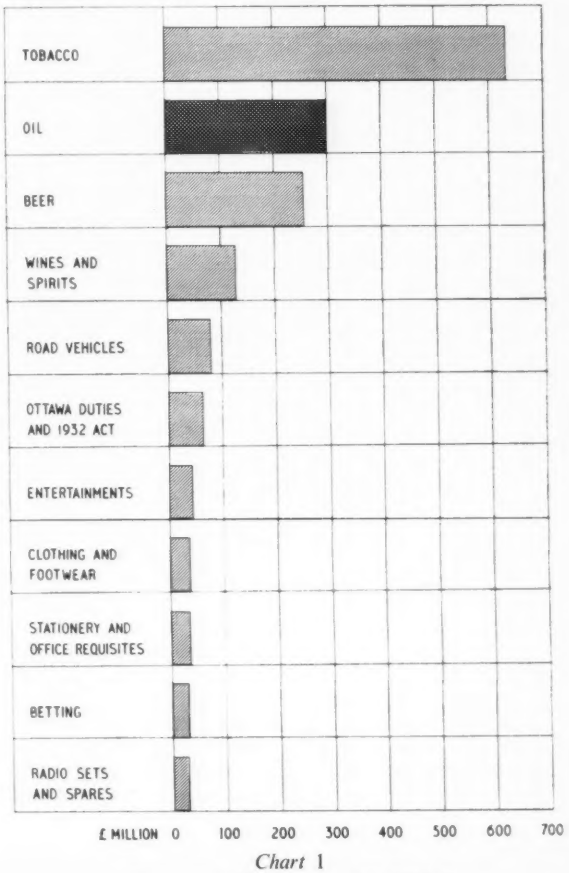


Chart 1
Customs and Excise Receipts 1954-5.

An impost such as the fuel tax cannot be absorbed and increases in fares have been widespread, while services in many cases have had to be cut down. The proper utilization of vehicle fleets is impeded and the capital investment which they represent is inadequately remunerated, while the long-term development of the industry is hampered and distorted by the artificial raising of costs on this scale.

The secondary effects are even more damaging. Because the vast majority of bus journeys, whether daily journeys to work or in the course of shopping by housewives, are essential, the cost of living is directly increased by higher fares and this sets up a demand for higher wages. In this sphere, therefore, the fuel tax is undoubtedly inflationary.

It is perhaps symptomatic of the whole series of complex

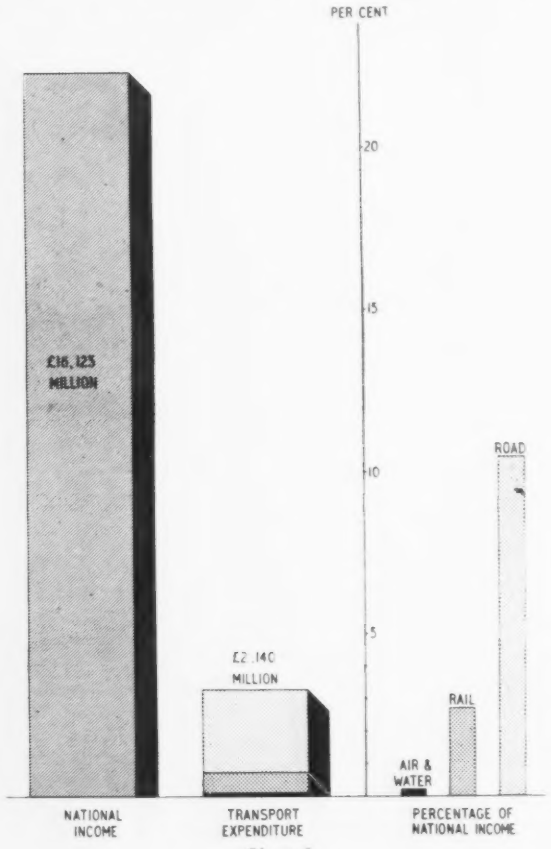


Chart 2

Expenditure on Transport in 1953 (*Great Britain*).

reactions which a high and unjustifiable level of taxation engenders that the more dangerous effects can only be countered by specific discriminatory measures, and very often the political attractiveness of different palliatives outweigh their economic value. This probably accounts for the support given by the T.U.C. to recent demands for a lower rate of tax on derv fuel, because its consumption is mainly in buses and coaches. In fact, of course, to reduce the tax on derv fuel alone and to leave the tax on motor spirit as it is, as is proposed, would serve only to distort choice and set up a whole series of new cost relationships between diesel and petrol vehicles.

The ancillary considerations which come into the picture are industrially of far-reaching importance. In the search for further economies to offset the increased running costs caused by the high tax, bus companies have been tempted to press late and spread-over duties beyond the limits of efficient working and this has created difficulties with the transport workers; from the long-term point of view all this is making it increasingly difficult to recruit staff. In addition, the less remunerative services in the countryside, as well as the off-peak services in the more thickly populated areas, are being cut. To show that concern for what is happening in the passenger transport industry is not confined to only one political party, it should be mentioned that in February this year, more than 30 Conservative M.P's. tabled a motion in the House of Commons protesting at the cuts in rural bus services, pointing out that this would inevitably accelerate depopulation of rural areas to the detriment of agricultural production, and calling for a reduction of tax on motor fuel as "an urgent priority".

Taxation on Industrial and White Spirits

If what has been said already concerns the main weight of oil taxes as they bear on road transport, it should not be overlooked that in other spheres, the taxes are no less harsh and inflationary. The levying of the 2*s.* 6*d.* per gallon tax on industrial and white spirits, where use is entirely in industrial process work, is a heavy and unjustifiable burden on production costs, while the anomalies between taxation on light and heavy hydrocarbon oils create major distortions of choice in agriculture. In all, the Chancellor is to raise £300 million in oil taxation in the current financial year, on a raw material used by every industry in the country. This is more than the total amount to be raised by the taxation of luxury and near-luxury goods, through the purchase tax, which is to yield £295 million.

This is a state of affairs which cannot fail to have repercussions on the entire national economy.

Effect of Taxation on British Motor Vehicle Design

W. S. Ault said:

In considering the effect of taxation on the design of British motor vehicles I have omitted income tax, in spite of its effect on the general economic climate of the country. Purchase tax has been regarded as a component of first cost for allowing depreciation. We are therefore left with the Road Fund tax and fuel tax as active influences on the design of vehicles.

So that we can see the contribution which these taxes and purchase tax make to the annual operating cost, I have prepared a chart for pre-war and post-war operation of three classes of vehicle, the true private car, the subsidized passenger car, and the heavy commercial vehicle driven by a diesel engine (Chart 5).

Effects of the Horse-power Tax

Whenever taxation and the design of motor vehicles are under discussion, sooner or later someone blames the now obsolete horse-power tax for our manufacturers' inability to compete with the large-engined American car in the export markets. Arguments on these lines were energetically employed before and after the last war, and eventually led to the disappearance of the horse-power tax on 1 January 1947.

I am as glad as anyone to see the last of the horse-power tax, but to hold it solely responsible for the development of the small-engined British car, often disparagingly called a buzz-box, is to my mind quite wrong. A very real reason for the buzz-box is that even before the last war few people in the U.K. could afford to run a large car.

However, there is one thing for which I cannot readily forgive the horse-power tax and that is the effect it had on the shape of British engines. You will recollect that it was based on a formula involving only the cylinder diameter and the number of cylinders, neglecting entirely the stroke and hence the cubic capacity of the engine. A tax based on cubic capacity would not have been unreasonable, but the horse-power tax, as it was, encouraged British designers to try to defeat the tax by producing engines with abnormally long strokes relative to the cylinder diameter, ratios as high as 2:1 being by no means uncommon. Engines of this artificially distorted shape suffered from high inertia loadings

of bearings, mechanical efficiency was reduced, safe cruising speeds were severely limited, with some notable exceptions wear rates tended to be high, and engines were unnecessarily tall and heavy.

Abolition of the horse-power tax has permitted British designers to produce, for the first time without hindrance, engines of the most desirable mechanical shape, and during the last few years nearly all manufacturers have brought out examples of the so-called "square" engine, with bore and stroke approximately equal.

The effect of the horse-power tax on the design of engines for commercial vehicles was similar. However, owing to the higher annual mileages generally covered by commercial vehicles, the effects of fuel costs have always been much greater than those of the horse-power tax. The horse-power tax is now dead and the present form of flat rate Road Fund tax appears to be without effect on vehicle design.

Effect of the Fuel Tax on Diesel Development

For any future influence on design we must, therefore, look to the fuel tax. Its past effects on commercial vehicles have been dramatic and in the late 1920's and early 1930's it was primarily the tax preference enjoyed by diesel fuel over petrol which encouraged the development of the high speed diesel for road use. At the outset it was a noisy, unreliable, and expensive piece of machinery, but it saved its users money, so that they overlooked its defects and it soon virtually displaced the petrol engine in heavy vehicles. Today, thanks to steady development, the diesel can stand on its own merits, as a thermally more efficient machine than the petrol engine, and continues to show substantially lower annual operating costs in spite of equal taxation on both fuels. For this reason the diesel is now invading the field of light commercial vehicles, hitherto powered with petrol engines broadly similar to those fitted in private cars. Diesel engines of suitable size are now available and are a particularly attractive proposition for any light commercial vehicles which cover a high annual mileage, say in excess of 30,000 miles, or which are subjected to a large proportion of idling time, as in door-to-door delivery. London taxi cabs are a peculiarly suitable application, some 700 taxis having been converted, mostly within the last year. Assuming an average annual mileage of 40,000, the annual saving in fuel cost is approximately £200, sufficient to pay for the cost of the conversion in the first year.

Let us consider now the effect of continued high fuel taxation on future British designs. I propose to omit the luxury car market, also the large-engined cars which are mostly operated as subsidized transport.

We can form a fair idea of likely trends by studying the French car population, since France has had to contend with fuel prices comparable with today's level in the U.K. for longer than we have and has not had the complication of purchase tax. One of the most popular true private cars in France today is the 4 C.V. Renault, with the 2 C.V. Citroen making a special appeal in country districts. The Volkswagen is also an extremely popular car in France and many other parts of Europe where petrol is expensive.

Economy Cars

Let us see how these examples illustrate the requirements of the true economy car. In order to achieve a low fuel consumption, and incidentally keep down initial cost, the car must be light and small, which applies to all three. In view of its light weight it should preferably have independent suspension all round, and it is noteworthy that all three models I have mentioned embody this feature. The aerodynamic drag of the body should be low, which is true for the Renault and particularly marked in the Volkswagen. The designer of the Citroen has paid less attention to aerodynamic shape on account of the severely restricted maximum speed of the car. Either a very small engine, necessarily operating at high r.p.m., may be used, as in the Renault, or a somewhat larger engine may be used with an unusually high top gear and so designed that it can operate indefinitely without distress at full throttle but at restricted r.p.m. The Volkswagen is probably the best example of the second approach, which is to my mind the more desirable, and gives in this car a safe continuous cruising speed in excess of the requirements of most owners whilst retaining small car economy. I believe that if fuel tax stays at its present level here our designs will inevitably follow a similar trend, unless there is a marked change in the general economy of the country.

In any examination of the future we obviously cannot overlook the use of the diesel engine for passenger cars. I believe it will have limited special applications, but this is really a subject in itself and was well covered at the recent symposium held by the Institution of Mechanical Engineers.

To summarize, I feel we can today dismiss the effects of the old horse-power tax as belonging to the past.

The present fuel tax, coupled with our generally restricted economy, encourages the development of passenger cars which are efficient as regards fuel consumption. Whether they are the best design for our crowded road conditions and driving habits is open to considerable doubt. Likewise, the effect on our exports is a highly controversial subject and no doubt other speakers will have something to say about this.

As regards commercial vehicles, there is no doubt that the present popularity of the diesel arose from past fiscal policy and that present policy encourages even wider adoption of this engine. Whether this is of overall benefit to the economy of the

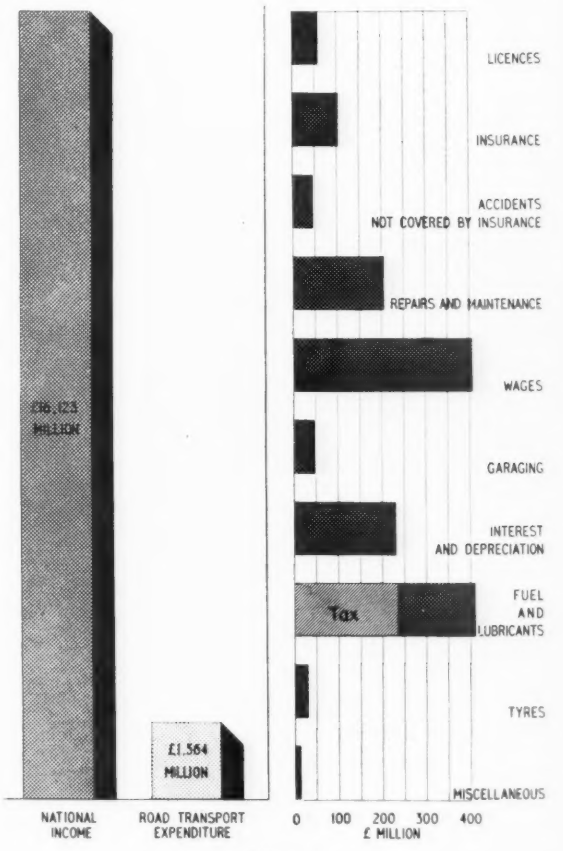


Chart 3
Expenditure on Operation of Road Transport in 1953 (*Great Britain*).

country is a question I should also like to leave for open discussion.

Effect of Taxation on Refinery Operations

A. A. Appleton said:

The three basic assumptions in this brief sketch of taxation as it affects refineries are:

(1) That it causes gasoline demand to be unduly restricted.
(2) That it causes middle distillate demand to be increased, owing to the need to manufacture tractor fuel and increased quantities of automotive diesel.
(3) That it causes the percentage of premium grade gasoline to be increased.

The distortion which has taken place in the U.K. petroleum market can be assessed by comparison of the 1955 predicted distribution, over broad grades, for the U.K. and for the U.S.A., where gasoline taxation is low:

Predicted Percentage of Industry Market 1955.

	U.K.	*U.S.A.*
	%	%
Gasoline	34	50
Middle distillate	37	28
Residual fuels	29	22

The basic refinery problem is to avoid the production of any surplus material. Should any unsaleable surplus be produced, even for only a relatively short period of time, the refinery would be forced to shut down once available storage became full. Thus, the limit to the crude to be run in a refinery is frequently not the potential distillation capacity, but the quantity of a single product which may be sold.

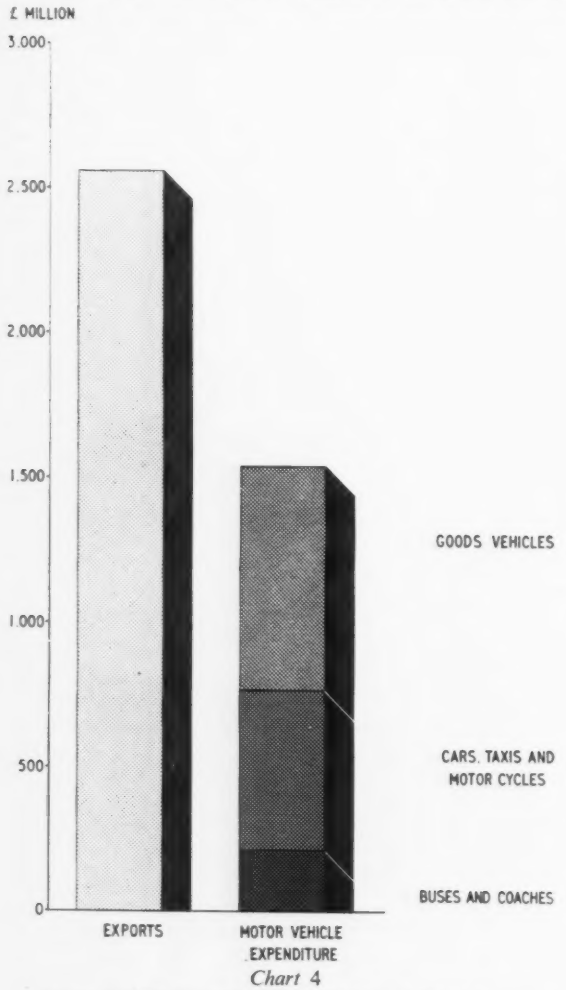


Chart 4

Motor Vehicle Expenditure in 1953 (*Great Britain*).

Since petroleum products are not chemical entities, there is some degree of flexibility in a refinery. One may take a wide or a narrow cut. The yield of straight-run naphtha can be varied between about 20 and 25 per cent, and straight-run gas oil yields can be increased from 25 to 30 per cent on Middle East crude without changing the sulphur content. If the total gasoline market is the limit, then a minimum gasoline cut will be taken, but this will fix the extent of the crude which will be run and hence the quantity of middle distillate which can be produced.

However, even with refiners operating at minimum straight-run naphtha and maximum middle distillate, it has been shown over recent years that the U.K. has imported quantities of kerosine, turbo-jet fuel, and tractor fuel. This indicates that overall, the refining capacity has not been utilized to the full, owing to the need to balance production round the gasoline requirement. A considerable proportion of these products come from dollar sources, so that the restricted demand for gasoline results in drains on the U.K. dollar balance to pay for imported middle distillates.

The gasoline bought at the pump consists not only of straight-run naphtha, which would not be of an adequate octane level, but also of a blend of straight-run material with various high octane blend stocks. These are obtained from thermal or catalytic reformers, or from catalytic cracking.

Catalytic Cracking and Reforming Processes

Modern premium gasolines require a high proportion of material from either catalytic cracking or from catalytic reforming, the octane level of material from thermal reforming equipment being insufficiently high. These two processes are to some extent complementary, but are also competitive with each other, and the size of the available gasoline market and the percentage of the total quantity of gasoline as premium affect the relative attractiveness of the two routes.

Briefly, catalytic cracking utilizes a heavy waxy feedstock which is unsuitable as saleable middle distillate and which would otherwise be incorporated in residual fuels. From this feed is produced refinery fuel gas, catalytic naphtha, polymer and cycle oils for use as diluents in fuel oil.

The process is attractive economically since it raises about 40 per cent of a feedstock of moderate value to gasoline value, the other 60 per cent retaining almost as high a value as when fed to the cracker. Since the viscosity of the cycle oils has been reduced by the catalytic cracking, they have a much greater effect in reducing residual fuel viscosity when employed as diluents than had the original feedstock to the cracker, so that viscosity specifications may be met with a smaller total residual fuel oil production per barrel of crude.

The characteristic of catalytic cracking is that it produces either higher octane finished gasoline, or a higher proportion of the same quality of premium gasoline in the total gasoline, at the expense of increasing the total of gasoline produced. Putting this the other way round, if the total gasoline is fixed, then an increase in the octane quality of the total gasoline pool can be obtained only at the expense of a reduction in crude run if the refinery is already cutting minimum straight-run naphtha.

This decrease in crude run may result in cat cracking becoming financially unattractive beyond a certain point.

Catalytic reforming, on the other hand, takes a low-grade heavy naphtha and produces from this feedstock refinery fuel and high octane blend stock. Economically, the process is not basically as attractive as catalytic cracking, since the feedstock is of a value which is close to that of finished gasoline, and a proportion of this is degraded to fuel value.

It has the advantage, however, that when employed as a means of increasing the octane of the gasoline pool, it tends to reduce

the total quantity of the pool, so that in fact it will permit crude runs to be increased, with an increase in refinery realization.

Thus, under conditions of limited gasoline outlet, the natural order of financial attractiveness may be reversed, and the incentive may be to put in catalytic reforming equipment in preference to catalytic cracking.

Most refineries operate with both cracking and reforming equipment for the production of gasoline, but any expansion in octane quality will be met by expanding whichever route is most attractive. Experience with catalytic crackers has shown that additional capacity may be obtained relatively cheaply by removing bottlenecks on the unit, and in an expanding gasoline market this would offer the most attractive expansion in the U.K., where there is already a considerable installed catalytic cracking capacity. However, some organizations in the U.K. petroleum industry have found it attractive to instal catalytic reforming capacity in place of existing thermal reformers. As a means of producing additional high octane material, this is bound to be considerably more expensive than bottleneck removal on existing catalytic crackers and is an indication of the price which the industry is prepared to pay to ensure remaining in gasoline balance.

One may question whether this is the most suitable employment of national resources, yet it follows directly from the government taxation policy.

An additional point which might be considered is that in attempting to widen the middle distillate cut, material of lower quality may be produced which would increase the investment in treating plant and hence the costs involved in preparing the product for the market.

Implicit in these two latter points is the fact that the majority of modern refinery techniques have developed in the framework of the world petroleum industry, where maximum gasoline production is the constant aim.

If the U.K. industry is forced into a different pattern, then we shall have to develop our own techniques to meet our individual requirements. There is little doubt of our ability to do so, but this may hasten the obsolescence of our existing types of equipment. This is bound to hasten the need for further capital investment in the petroleum industry, which may be a needless diversion of national resources, which might be avoided by an alteration in taxation policy.

To sum up, the problems which taxation brings to the refiner are capable of solution but the most economic pattern of operation is prevented.

Discussion

Before opening the discussion, the Chairman referred to the title "Dilemma or Challenge?" as being a very apt summary of the position. He also mentioned that while it was originally intended to include a discussion of the international aspects of the taxation problem, it had been decided that this should be treated at some later date as a separate subject.

G. P. Glass then opened the discussion by suggesting that the chief reason for the existence of the problem of heavy taxation was the high rate of Government expenditure. He felt that it was important, although delicate issues were involved, that this high rate should not be regarded as sacrosanct. Turning to the subject of the value of exports of motor vehicles to the U.K's balance of payments, Mr Glass made the point that if the effect of taxation in this country was to make us concentrate on the production of small cars, then we should be ill-equipped to compete with such countries as the U.S.A. in foreign markets where the demand was for larger, more powerful, cars and that this would ultimately be to our detriment from the balance of payments point of view.

W. S. Ault found this point interesting, but mentioned that he was in favour of the argument that the U.K. should not try to compete in foreign markets for large cars but should concentrate rather on foreign markets for the smaller type of car. At this point H. E. Barry mentioned the possibility of a middle course—we should perhaps aim at producing for export something more powerful than, say, the Renaults and Citroens, but not so powerful as, say, the Cadillacs. With this point of view both Mr Ault and Mr P. Gibson found themselves in agreement, Mr Gibson pointing out that since a sound export market should be based on a sound home market, and since the high level of U.K. taxation would limit the consumer's ability to purchase and run a large car, it would be better to concentrate on producing cars of the Volkswagen type. At this, R. E. Marks suggested that by concentrating on the production of small cars we would overlook important markets such as Australia.

C. P. Dalton then steered the discussion towards a different

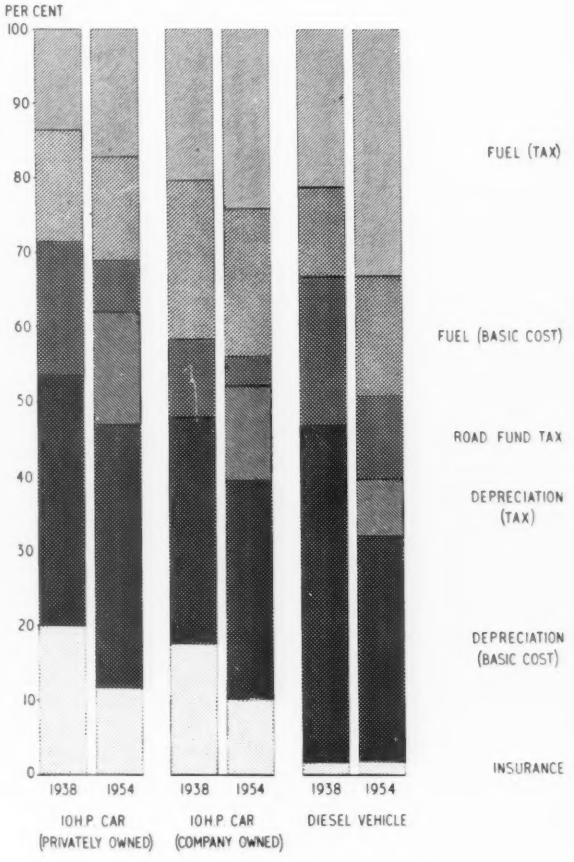


Chart 5
Vehicle Operating Costs.

topic by wondering whether, in view of the greater mileage per gallon obtainable from auto-diesel fuel, the duty on it ought not to be greater than the duty on gasoline. In reply, M. E. Weinstein said that he felt that in this case political considerations were outweighing economic considerations, indeed he thought it very likely that the pressure would not be for an equalization of the inherent disadvantage of the petrol vehicle, but rather the opposite. Mr Weinstein did, however, feel very strongly that it was essential to bring home to the Chancellor of the Exchequer the economic distortion brought about by the high rate of tax.

After expressing his agreement with these remarks, L. A. Potter went on to talk about the inflationary effect of the petrol tax. He thought that, although in some respects the tax was

inflationary, to reduce it might also have the same effect in so far as a reduction in the tax on diesel fuel might well lead to increased pay demands on the part of railway employees. Mr Potter went on to wonder whether, in view of the already overcrowded conditions of the roads in the U.K., the Government were using the very high rate of tax purposely to avoid further congestion. It was possible also that the high rate of fuel tax choked off home demand for cars, thereby allowing more cars to go for export.

Next, J. H. M. Clark said he would be interested to hear how the tax affected the various grades of motor spirit. Had the demand for regular grade gasoline eased up to such an extent as to justify the present price differentials? A. A. Appleton, in reply, said that he would not like to comment on whether the present differentials were justified or not, but he did indicate that, in his own view, the price differential between the premium and regular grades was still not big enough.

At this point, R. J. Bressey asked Mr Appleton if he advocated differential taxation as between diesel fuel, regular grade gasoline, and premium gasoline. Mr Appleton said that he was not in favour of differential taxation—what he really would like to see was a general lowering of taxation on all motor fuels. He felt this would result in (a) a slowing down in the change over to diesel fuel, and (b) a reduction in the number of cases where cars were run on premium gasoline when the regular grade was quite adequate.

A. L. King then brought the discussion and the meeting to a close by thanking the various speakers for their contributions.

★ ★ ★

Petroleum in Parliament

New Developments in the use of Oil

The part to be played by oil in the future development of the gas and electricity industries was discussed by the Minister of Fuel and Power on 9 July, when the Gas and Electricity (Borrowing Powers) Bill was given its second reading in the House.

The Minister prefaced his references to oil by saying that the oil industry was one of the largest and most virile industries in the world and its production was at present expanding at a rate faster than coal had ever done, even in the greatest days of the coal industry.

Mr Lloyd went on to discuss the importance of oil as an alternative means of supplying the energy requirements of the electricity industry. Enquiries had been made, he said, into the possibilities of using oil instead of coal at new power stations conveniently situated near the new refineries, and as a result, the new Marchwood power station on Southampton Water was to be equipped with dual firing apparatus able to utilize either coal or oil. Arrangements had been made with the Esso Petroleum Company to supply oil at a price which would make the cost of generation of electricity the same as if coal were used.

The desirability of installing dual firing apparatus in a considerable number of power stations in river estuaries which could conveniently be fed by tanker from the refineries was, the Minister said, under consideration.

Progress was also reported by the Minister in the development of a catalytic process of making town's gas directly from fuel oil without the use of coal. Two processes had been developed, the Minister said, one by the West Midlands Gas Board in Birmingham, and the other by the South-Eastern Gas Board in Sydenham. These processes were of particular interest because the coal saved would be the high grades of gas carbonization coal at present used by the gas industry.

Earlier in his speech Mr Lloyd referred to the search for natural gas in the U.K. and said that if it were successful it would be a great national resource for the country. A small find had, he said, already been made and there was a feeling of considerable hope among those who were actually doing the work.

U.K. Consumption of Hydrocarbon Oils

On 6 July the Chancellor of the Exchequer gave the following provisional information regarding the quantity of different classes of hydrocarbon oils retained for consumption in the U.K. during 1954 and the amount of duty paid on these oils.

	Oils chargeable with Customs duty	
	Quantity	Receipts of duty
	Gallons	£
Light Oils	1,924,400,976	240,725,150
Of which motor (including aviation) spirit	(1,875,425,179)	(234,591,587)
Heavy oils for use as road fuel	321,863,039	40,224,318
Other heavy oils	4,713,775,845	620,518
of which fully rebateable	(4,564,851,837)	
	Oils chargeable with Excise duty*	
	Quantity	Receipts of duty
	Gallons	£
Light oils	115,277,282	8,794,439
Of which motor (including aviation) spirit	(77,154,649)	(5,926,604)
Heavy oils for use as road fuel	24,022,254	1,831,775
Total		292,196,200
Allowances under Section 206 of the Customs and Excise Act, 1952		2,311,872
Net total		289,884,328

*Excise duty was reduced by 6*d*. a gallon with effect from 14 October, 1953.

Steel Industries' Use of Coal and Oil

The Minister of Fuel and Power recently gave the following statistics of coal and oil consumed by the steel industries in the years 1948 to 1953. Iron foundries, coke ovens, and blast furnaces are excluded.

Year	Thousand Tons	
	Coal	Oil
1948	7818	839
1949	7822	926
1950	7618	1003
1951	7341	1017
1952	7100	1124
1953	6594	1328

The Hon. Editor—Professor F. H. Garner—retires

As most readers of the *Journal of the Institute of Petroleum* and *IP Review* will already have learned with regret, Professor F. H. Garner, O.B.E., resigned from the Honorary Editorship and the Chairmanship of the Institute's Publications Committee from the date of the Annual General Meeting in April 1954. This action was not the result of any lessening of Professor Garner's interest in publication matters, but due solely to the pressure of many other commitments and the time occupied in frequent travel from Birmingham to London. We are glad to record he is remaining a member of Publications Committee and that his long experience and wide knowledge of publications matters will still be at the service of the Committee and of the Institute.

Professor F. H. Garner

Professor Garner is a very well-known figure in the petroleum world. Educated at Birmingham University and Pittsburgh (U.S.A.), where he was an 1851 Exhibition Scholar at the Mellon Institute, he was for a time on the staff of the R.A.E. Farnborough before becoming successively Chief Chemist of the Agwi Petroleum Company and the Anglo-American Oil Company and then, in 1935, the first Director of the Esso European Laboratories. In 1942 he succeeded the late Professor A. W. Nash in the Chair of Oil Engineering and Refining at Birmingham University. The department has subsequently become that of Chemical Engineering and is one of the most important schools of that subject in Britain. His work with the Petroleum Warfare Department during the war years was recognized by the award of the O.B.E. in 1943 and of the U.S. Medal of Freedom in 1947. Professor Garner's contributions to scientific and technical literature have been numerous and important and these led to the award to him in 1951 of the Redwood Medal of the Institute of Petroleum, the Melchett Medal of the Institute of Fuel, and the Osborne Reynolds Medal of the Institute of Chemical Engineers.

He has a long record of service to the Institute, becoming a Member of Council in 1930, a Vice-President in 1937, and serving as President from 1944 to 1946. Apart from many other Institute activities, such as Chairmanship of Standardization Committee for a number of years, Professor Garner became Honorary Associate Editor in 1937 and Honorary Editor and Chairman of Publications Committee in 1946. Besides his activities in the academic field, his service on important outside committees, and his work for the Institute of Petroleum, Professor Garner has also played a prominent part in the proceedings of several other scientific and professional societies. He has also found time to become a notable collector of books and pottery and is a Fellow of the Society of Antiquaries. His book on English Delftware (1948) is the standard work on the subject.

During the forty years since its incorporation in 1914, the Institute has had only three Honorary Editors. The first of these, the late W. H. Dalton, F.G.S., occupied the Chair from 1914 till 1920. He was succeeded by Dr A. E. Dunstan whose tenure of office, from 1921 to 1946, covered a large part of the Institute's existence. Mr Dalton's work laid the foundation of the Institute's *Journal;* Dr Dunstan was largely responsible for consolidating this and extending the publication activities of the Institute. Professor Garner took over for the post-war period—a period of rapid change and expansion in the Institute's activities. This has been particularly so in regard to standardization activities, Branch affairs, and the holding of

On the occasion of his retirement from the Honorary editorship, Professor F. H. Garner was guest of honour at a luncheon at which the hosts were members of the Publications Committee and its sub-committees. Those present were (left to right): *E. J. Horley, D. A. Hough, H. Hyams, J. Parrish, H. C. H. Thomas, E. Cooper-Scott, J. G. Hall, C. L. Gilbert, W. H. Thomas, J. H. G. Carlile, T. C. Owtram, Dr E. B. Evans, Dr E. J. Boorman, Professor F. H. Garner, F. L. Garton, D. L. Samuel, G. P. Glass, Dr C. Cawley, H. S. Gibson, J. B. Kay—and the Editor, who took this photograph.*

Dr E. B. Evans

special conferences and meetings. These have led to corresponding growth in the work of Publications Committee. The need for an additional periodical of a different character from the *Journal* became evident and the *IP Review* was successfully launched in 1947. From the beginning of 1954 a major change has occurred in the format of both publications, with the introduction of the large-size page. These and many other changes of both a technical and organizational nature have been introduced into the publications side of the Institute's activities under Professor Garner's guidance. The Institute owes much to the three Honorary Editors who have done so much to build up its Publications to their present standard and not least to Professor Garner for his work during the eight years in which he has occupied the Chair with such distinction and success.

The New Honorary Editor

Consequent upon the retirement of Professor Garner, the Council of the Institute unanimously appointed Dr E. B. Evans to the Honorary Editorship and the Chairmanship of the Publications Committee.

Dr Evans, who was first elected to the Council in 1939, has been a member of the Publications Committee since that time and its Deputy Chairman and Honorary Associate Editor since 1946. He has also been chairman of the Papers Sub-Committee since its formation in 1946; during this period the Committee has been faced with the arduous tasks of rearranging the Institute's meeting programme, of organizing the collection of papers for innumerable congresses and conferences, and the organization of the technical sessions of the successful IP Summer Meetings held in the last two years. He also serves and has served on a number of other committees of the Council.

Dr Evans first joined the petroleum industry in 1936 as a chemist with the Anglo-American Oil Co. Ltd. (now Esso Petroleum Co. Ltd.), working successively at the Purfleet installation, at the Vauxhall laboratories, and in the Technical Sales Department. During the second world war he was seconded to the Petroleum Board from 1939 to 1945. Shortly after this period he joined the newly-formed Esso Development Co. Ltd., and in 1950 became its Chief Chemist. The author of numerous papers, chiefly concerning fuels and the properties of hydrocarbons, he has contributed much to the Institute's *Journal* and other publications.

The New Honorary Associate Editor

The new Honorary Associate Editor and chairman of the Papers Sub-Committee is D. L. Samuel, who first joined the Council of the Institute in 1948 and who has served continuously on the Publications Committee and its Papers Sub-Committee since that time.

D. L. Samuel

Following service in the first world war with the Royal Engineers, Special Brigade, Mr Samuel joined English Oilfields Ltd. in 1921 and was occupied with work on shale oil for the next three years. He then worked for a short time with the late Professor Brame at the Royal Naval College at Greenwich and in 1927 joined the Shell Petroleum Co. Ltd. For twelve years he was engaged in the laboratories on investigations concerning lubricating oils and greases, and in 1938 was transferred to the Head Office of the Company as Technical Advisor on lubricants.

For a time Mr Samuel also acted as Technical Editor to *Engineering Materials*.

★ ★ ★

Council Commentary

At the Council Meeting held on 9 June the report of the Publications Committee showed that this side of the Institute's activities was still in a very flourishing condition. Council had learned with great regret of the resignation of Professor Garner from the positions of Honorary Editor and Chairman of Publications Committee which he had held for so long and with such marked success. Professor Garner's duties will be taken over by Dr E. B. Evans who, as most members know, has for a considerable period been the Chairman of the Papers Sub-Committee which is responsible for practically all the Institute's publications and for the organization of the Institute's technical and scientific meetings.

In order to express the Institute's great appreciation of Professor Garner's work over the past years, the Publications Committee organized a luncheon party in his honour at which were present many members of the Publications Committee and others who had been closely associated with Professor Garner in his editorial duties.

Mr D. L. Samuel has been elected Chairman of Papers Sub-Committee and Honorary Associate Editor in succession to Dr E. B. Evans.

It was learned from the Engineering Committee that the Marketing Safety Code was now practically complete and it was confidently hoped that this would be available for issue in about three months time. Another item of interest recorded was that the Spectroscopic Panel of the Hydrocarbon Research Group plans to hold a symposium during October of this year which will be attended by many internationally known spectroscopists.

★ ★ ★

HD OILS

The following additional oils have been approved by the Director of Chemical Inspection, Ministry of Supply, as complying with the requirements of defence specification DEF 2101, Grade OMD 110 :—

Suppliers' Nomenclature	*Supplier*
Commerce 830 V	Commerce Oil Corporation
Germil 102*	Germ Lubricants Ltd.
Primor Mil 30 HD	Manchester Oil Refinery Ltd.
Suprex HD 30 diesel engine oil	Stellar Oils Ltd.
Silkolene Nectar 10* . . .	Dalton and Co. Ltd.

*OMD 40

Around the Branches

FAWLEY, LONDON, NORTHERN, PERSIAN GULF, SCOTTISH, SOUTH EASTERN, SOUTH WALES, STANLOW, TRINIDAD

London Branch

On Wednesday, 21 April, at the Institute of Mechanical Engineers, Storey's Gate, a paper on "Engine Design as Affected by Fuels and Lubricants" was given by C. A. Beard and D. Downs to an audience consisting of members of the London Branch and members of the graduates and students section of the Institute of Mechanical Engineers.

The increase in spark-ignition engine power and efficiency, the authors said, had been owing to a simultaneous mastery over mechanical, metallurgical, and chemical problems. At times the fuel technologists had produced fuels before the reliability of engines was such as to permit their full value to be exploited. At other times the engine designer had run ahead of the fuel technologists.

The first major improvement was a result of the realization that "knock" was associated with fuel quality as well as with engine design, and the joint improvement in fuel octane value and design enabled compression ratios to increase from average values of about 4.8 to 7.0. To-day, some engines had compression ratios of 8.0 to 8.5 and even as high as 12.5. The optimum was probably about 8.0.

The authors discussed combustion chamber design at length and gave details of the development of the overhead valve and turbulent head side valve. They also described various effects of turbulence and flame travel.

The paper dealt with another factor which has a considerable effect on engine performance—the combustion chamber deposits resulting from the oxidation or partial oxidation of the fuel and lubricating oil. The authors said that where these deposits were heavy the octane requirement of the engine was considerably increased. This was a problem which was occupying the minds of fuel technologists at the present time, for those deposits were influenced by the quality of fuels, lubricants, and additives.

The mechanical design of the spark-ignition engine was discussed and also the use of tetraethyl lead as a fuel additive. While tetraethyl lead increased the octane value of a fuel the authors said that it nevertheless had the disadvantage of leaving heavy deposits which had to be evacuated by incorporating volatile halides with the additive. These lead scavengers to some extent removed the deposits left by the T.E.L. Corrosive attack of the crown of exhaust valves by T.E.L. would occur but this was more likely to happen in aircraft engines than in automobiles. Attention was drawn to the fact that a useful method of prolonging valve life was to cause the valve to rotate and three types of valve rotators were illustrated.

The authors went on to say that with the compression-ignition or diesel engine the development of engine design had not been so dependent on fuel quality as it had been with the petrol engine. There was little difference in diesel fuel today as compared with the product used 25 years ago. Such improvement as had been effected in the disesel engine had been a result of improved power output and thermal values. The combustion chamber and mechanical design of compression-ignition engines were then discussed at some length.

As regards fuels for diesel engines, the authors said that the cetane number, which indicated the ignition quality of the fuel, was probably the most important characteristic. A good diesel fuel gave ease of ignition rather than spontaneous combustion. It also gave easier starting and smoother and less noisy operation at speed. Today, petroleum refiners did not have much difficulty in producing a fuel of good cetane number and, in fact, fuels derived from Middle East crudes often had cetane numbers of 55 to 58 as compared with the 45 to 50 level which could give satisfactory performance.

Diesel fuels from Middle East crudes, however, contained fairly high sulphur contents, and this gave rise to increased cylinder liner and piston ring groove wear. This could, to some extent, be overcome by operating at high water jacket temperatures and by arranging to have a thermostat to ensure a rapid warm-up period. While the use of heavy diesel fuels was increasing, here again high sulphur contents, as well as high ash and asphaltene contents, might give rise to trouble.

The authors then discussed lubricating oils of low viscosity which are becoming popular to-day because of the savings in fuel consumption which can be effected by their use. They said that the oil should be of as low viscosity as possible in order to minimize power losses owing to viscous friction, and to give ease of starting under cold conditions.

The increased power outputs, particularly of diesel engines, led, the authors said, to a demand for oils containing anti-oxidants, detergents, and anti-wear additives, and the authors went on to discuss the effects of additive-treated oils, in particular their ability to combat the deleterious effects of oxidation products and sulphur.

The discussion which terminated this meeting was opened by G. M. Barrett and taken up in lively manner by many members of the audience. A vote of thanks was then proposed by Mr Sharpen of the Graduates and Students Section of the Institute of Mechanical Engineers.

Trinidad Branch

The 135th General Meeting of the Branch was held at the Clifton Hill (United British) Club, Point Fortin on 4 June, 1954. The Branch Chairman, Dr A. L. Down presided, and a talk was given on "Lubricating Oil Refining", by E. J. Dawson, B.A., F.Inst.Pet., refinery manager, United British Oilfields of Trinidad.

Mr Dawson explained briefly the normal plan followed in the manufacture of lubricating oil base stocks for blending, dealing in some detail with the more common processes of propane deasphalting, solvent extraction, solvent dewaxing, and clay contacting. The factors governing choice of process were discussed. In conclusion, brief reference was made to the manufacture of speciality oils, *e.g.* transformer oil and white oils. The talk was illustrated with drawings and photographs.

A discussion followed and the meeting ended with a vote of thanks to the speaker moved by H. C. Costelloe.

Persian Gulf Branch—Kuwait Sub-Branch

The activities of the Kuwait Sub-Branch during June included two interesting talks.

At the meeting held on 2 June, J. M. Dougary gave a talk on "Aviation Gasoline".

The Chairman, V. J. Chir, introduced the speaker, and Mr Dougary, before proceeding with the main theme of his talk, gave a brief account of the properties of hydrocarbons in the aviation gasoline range, emphasizing the differences between straight-chained and branched-chained paraffins. The fact that the branch-chain or iso-paraffins, with excellent properties as components of aviation gasoline, have different boiling points from the straight-chain paraffins, with poor performances as aviation gasoline components, provides a relatively simple method of separation. Other naturally-occurring hydrocarbons used in aviation gasoline manufacture, such as the benzole group, were also mentioned and finally, Mr Dougary dealt

with the relatively inert properties of the hydrocarbons in the aviation gasoline range and discussed the fact that fairly drastic treatment, such as thermal reforming, was usually necessary for them to react. Unsaturated gaseous hydrocarbons produced by thermal reforming provide a valuable raw material for the preparation of synthetic iso-paraffins.

The specification for 100-octane aviation gasoline was described and the speaker explained that the specification was laid down in such a manner that the fuel would be satisfactory under service conditions. Each of the various items in the specification and the reason for them were explained. The components most frequently used in the manufacture of aviation gasoline were detailed and also the properties which these confer on the final fuel.

The talk ended with a description of the manufacture of each of the components of aviation gasoline, illustrated by a flow diagram. The most interesting of these processes, as far as a chemist was concerned, were alkylation and isomerization. It was interesting to note that the alkylation process was discovered and developed by the A.I.O.C. Research Department at Sunbury from 1936 onwards. Even so, the ever-increasing demands during wartime for aviation gasoline led to the full-scale development of the butane isomerization process since the quantities of naturally-occurring *iso*butane were insufficient to meet requirements. The butane isomerization process was developed extremely rapidly, despite immense technical difficulties, from laboratory to full-scale production.

A lively discussion followed the talk and the meeting closed with a vote of thanks to the speaker proposed by K. Turner.

At the meeting held on 16 June, L. J. Cotterill presented an interesting talk on "Sea Water Evaporators". Five illustrations of the outside and inside of the sea water distillation plant at Mina-al-Ahmadi were shown on the screen.

After an introduction by the Chairman, Mr Cotterill stated that, at one time, all fresh water used by the company was brought by a fleet of tankers from the Shatt-al-Arab river and pumped to Ahmadi from Shuwaikh, a distance of 20 miles. A decision to provide an internal source of supply resulted in the construction of the present plant, designed and manufactured by the Westinghouse Electric Corporation in conjunction with Messrs Ewbank and Partners.

Mr Cotterill explained that the plant consisted of six sets of evaporators, each composed of three large horizontal cylindrical vessels; giving a "triple effect". Of the sea water that is fed to these vessels, half is evaporated and later condensed into drinking water and half is returned to the sea as waste. For the first effect vessels, steam for evaporation of the sea water is provided from the boiler plant of the power station at low pressure. For the second and third effect vessels, heat is supplied by hot vapour from the first process.

The distillate obtained from the main condenser, which is cooled by the incoming sea water, has a very low mineral content. To prevent it from being insipid to the taste, and to ensure a supply of essential minerals, it is mixed with a small proportion of brackish water before leaving the plant.

At the conclusion of the talk a number of questions were asked by the members. Interest was such that the Chairman announced that a further talk would probably be given describing the detailed operation of the distillation plant.

A vote of thanks to the speaker was proposed by Mr Colenutt.

★ ★ ★

BOOKS

Power from Petroleum

The June 1954 issue of *The Technical Journal of the Brush Group* is wholly devoted to petroleum, the whole of its 48 pages containing a series of illustrated articles dealing with the more important aspects of petroleum production and its utilization for the production of power.

Health in Industry

The Institute of Industrial Health, of the University of Michigan Medical Centre, (1630 University Hospital, Ann Arbor, Michigan) has recently issued an interesting booklet on "A new look at health on the job". The booklet describes the work of the Institute in the fields of industrial medicine, occupational health, and industrial hygiene, and a useful list of publications on these subjects is appended.

Matthew Hall Library Catalogue

Matthew Hall & Co. Ltd. have just issued a catalogue of books to be found in their libraries in London and in Johannesburg. An author index and a subject index are provided, the latter having seventeen main sub-divisions. Books are available on loan and both libraries are open to visitors. Addresses are: 26-28 Dorset Square, London, N.W.1, and 52 Commissioner Street, Johannesburg.

U.K. Petroleum Statistics

The Ministry of Fuel and Power Statistical Digest for 1953 has recently made its appearance (HMSO, £1 1*s.* 0*d.*) and contains much valuable information concerning the supply and consumption of petroleum products in the U.K. Except for figures relating to personnel employed, etc., and certain refining operations, all tables relate to periods up to and including 1953. Much of the information in this publication is unobtainable elsewhere.

A special section of the 1953 digest relates to a survey of Steam and Power Usage. This is based on a questionnaire sent to 4602 firms engaged in 15 industrial groups, each firm being believed to consume over 2000 tons of fuel per year (oil equalling twice its weight of coal). Of these firms 3858 (83·8 per cent) replied, their total fuel consumption being (in thousand tons) 59,541. This total was made up of 48,833 solid fuel, 3614 liquid fuel, and 698·8 million therms of town, coke oven, and petroleum gases.

* * *

LONDON COURSES IN PETROLEUM

The 1954-55 Prospectus of the Sir John Cass College shows that the following courses of interest to the petroleum industry are being arranged for the session, the terms being: first, 27 Sept.-18 Dec. 1954; second, 3 Jan.-26 March 1955; third, 18 April-2 July 1955.

Petroleum Technology—A course of about 20 lectures at 3.30 p.m. on Thursday afternoons during the first and second terms.

Distillation—Eight lectures on Friday evenings in the second term.

Heat Transfer—Eight lectures on Friday evenings in the first term.

Spectrochemical Analysis—Ten lectures on Friday evenings in the first term and practical work in the second term.

Microchemical Analysis—Ten lectures on Thursday evenings in the second term and practical work in the third term.

Absorption Spectroscopy—Ten lectures on Friday evenings in the second term and practical work in the third term.

Statistical Methods—Twenty-four lectures on Monday evenings in the first and second terms.

IP JOURNAL ON MICROFILM

Microfilm editions of the *Journal* of the Institute are now available to members of the Institute and to subscribers from University Microfilms, 313 North First Street, Ann Arbor, Michigan. The great advantage of this method of reproduction is the large saving in storage space compared with the printed and bound edition.

The current catalogue issued by University Microfilms shows that the *Journal* is available from the 1950 volume, the approximate cost being $5·80 per volume. The list also indicates that many publications of interest to the petroleum industry are also available as microfilms.

Capital Control of World Oil Production

Details published by the U.S. Bureau of Mines (*International Petroleum Trade*, 1954, **23**, 17-19) and compiled by F. X. Jordan from various sources, give information concerning the production of crude petroleum, by countries and by capital control.

In the accompanying table, the details have been extracted as far as areas are concerned and percentages have been calculated and added. It is noted that over the period covered—1950 to 1952—there has been no material change for the world total.

CAPITAL CONTROL OF CRUDE PETROLEUM PRODUCTION

Area and Capital	1950		1951		1952	
	1000 *brl*	%	1000 *brl*	%	1000 *brl*	%
North America:						
United States	1,914,747	91.4	2,185,397	91.3	2,226,621	90.9
British and British-Dutch	92,324	4.4	106,514	4.5	116,724	4.8
Other private	16,335	0.8	24,386	1.0	28,888	1.2
Local government	72,443	3.4	77,312	3.2	77,275	3.1
	2,095,849	100.0	2,393,609	100.0	2,449,508	100.0
South America:						
United States	392,046	62.9	434,903	61.6	452,979	60.8
British and British-Dutch	210,398	33.7	243,662	34.5	255,657	34.3
Other private	1,900	0.3	1,878	0.3	1,670	0.2
Local government	19,080	3.1	25,449	3.6	34,831	4.7
	623,424	100.0	705,892	100.0	745,137	100.0
Europe:						
United States	3,806	1.1	4,154	1.2	4,655	1.2
British and British-Dutch	3,194	1.0	3,331	0.9	3,592	0.9
Other private	6,105	1.8	7,952	2.2	9,895	2.4
U.S.S.R.	316,397	95.5	338,323	94.9	382,840	94.6
Local government	1,991	0.6	2,784	0.8	3,606	0.9
	331,493	100.0	356,544	100.0	404,588	100.0
Asia:						
United States	308,970	42.0	434,886	53.5	515,931	58.7
British and British-Dutch	403,291	54.8	344,486†	42.3	306,646	34.9
Other private	15,268	2.1	20,231†	2.5	38,538	4.4
U.S.S.R.*	7,000	1.0	7,000	0.9	7,000	0.8
Local government	838	0.1	6,863	0.8	10,976	1.2
	735,367	100.0	813,466	100.0	879,091	100.0
Africa:						
United States	4,047	24.2	4,006	23.6	3,918	22.3
British and British-Dutch	12,326	73.8	12,305	72.6	12,546	71.4
Other private	329	2.0	636	3.8	1,106	6.3
	16,702	100.0	16,947	100.0	17,570	100.0
Oceania:						
Other private	8	—	7	—	2	—
WORLD TOTAL:						
United States	2,623,616	69.0	3,063,346	71.5	3,204,104	71.3
British and British-Dutch	721,533	19.0	710,298	16.6	695,165	15.4
Other private	39,945	1.0	55,090	1.3	80,099	1.8
U.S.S.R.	323,397	8.5	345,323	8.1	389,840	8.7
Local government	94,352	2.5	112,408	2.5	126,688	2.8
	3,802,843	100.0	4,286,465	100.0	4,495,896	100.0

* Sakhalin only.

† Persian production, nationalized in March, reported as Anglo-Iranian until July.

Trade Literature, etc.

Metal Spraying

An illustrated booklet has been produced by Metallisation Ltd., Barclays Bank Chambers, Dudley, Worcs., which gives details of the Company's British wire process of metal spraying. The booklet describes the way in which metal spraying is used to provide protection against heat oxidation and corrosion, and to enable worn parts to be reclaimed.

The theory of metal spraying is discussed and details are given of the services which the Company provides.

New Type of Transformer Oil

Manchester Oil Refinery has announced the development of a new type of transformer oil containing chemical additives which "passivate" the oil against metals. It is claimed that this new type of oil has no tendency to dissolve copper or iron, and that if soluble copper compounds are accidentally introduced into the oil they are rendered harmless.

An anti-oxidant has also been added to the new oil.

Electronic Equipment

Electronically controlled weighing, measuring, filling, and recording equipment was exhibited at the Mechanical Handling Exhibition in London recently by the British Tabulating Machine Co. Ltd.

This machinery, in predetermined sequence, automatically records the tare of containers, fills them to an accuracy of plus or minus 0.22 per cent of the required weight, and then registers and prints the net weight of material poured into each container, together with the container's serial number and the batch number. At the end of each batch a further slip is automatically printed which shows the total throughput for the batch.

The equipment can be used for weighing and feeding all types of material, solids, powders, liquids, or gas. The electronic control unit for each machine is designed to meet individual requirements.

"Turbogrid" Distillation Trays

Metal Propellers Ltd., of 74 Purley Way, Croydon are now manufacturing Shell-patented "Turbogrid" distillation trays under licence.

The Turbogrid tray is a new type of vapour-liquid contacting tray for distillation processes in the petroleum refinery, chemical, and petrochemical industries. It was produced as a result of work carried out in Shell research laboratories.

Hydrometers

A new catalogue giving details of hydrometers manufactured by H. J. Elliott Ltd., is available from the "E-Mil" Works, Treforest Trading Estate, Pontypridd.

Technical Leaflets

A group of new technical leaflets prepared by W. Edwards and Co., of Manor Royal, Crawley, Sussex, deals with the following selection of the Company's products: oil and mercury diffusion pumps; redesigned mercury and oil manometers; a new micro-moisture determination apparatus; silicone diffusion pump fluids, and a small glass-working lathe.

Tower Packings

A second edition of "Tower Packings and Packed Tower Design" by Max Leva has been published by The United States Stoneware Company of Akron, Ohio. This new edition has been greatly enlarged and takes the form of a well-illustrated textbook containing approximately 200 pages.

The book deals almost exclusively with those packed towers which carry specially shaped ceramic bodies. Definite methods of packed tower design have been evolved in recent years and Mr Leva's aim has been to present the most important details in brief form. Basic methods which are predominantly used at the present time are presented, together with typical data and performance comparisons of packings.

New material not previously presented in the technical press has been included in the book, particularly on the subjects of gas-liquid pressure drop, loading, flooding, and liquid hold-up.

Laboratory Chemicals

A new price list of chemicals, Nivoc analytical reagents, standard solutions, and stains has been prepared by W. J. George and Becker Ltd., and can be obtained from Nivoc House, Ealing Road, Alperton, Wembley, Middlesex.

New Photometer

Details are now available of a new vacuum-cell photometer designed by the Baldwin Instrument Co., Ltd., Dartford. It can be incorporated in photometric instruments such as colorimeters, spectrometers, etc., and is said to be both sensitive and accurate.

Liquid-level Controller

A new leaflet has been prepared by Sunvic Controls Ltd., 10 Essex Street, Strand, London, W.C.2, giving details of the Sunvic liquid-level controller.

Teepol 530

Two booklets have been published by Shell which deal with the use of Teepol 530 in the scouring of raw wool and the processing of cotton. Teepol 530 is an anionic synthetic detergent with properties which make it particularly suitable for the initial processing of raw wool. In cotton processing it is recommended for wetting and penetrating, detergency, dispersing, and lime soap dispersion.

"Uncommon Clay"

The formation and growth of the Refractories Group of The Morgan Crucible Co. Ltd. are described in a new "picture book" recently published by the Company.

Photographs taken at the Group's latest factory at Neston, Cheshire are chosen to show the many different aspects of refractories production.

Battle for the Harvest

An instructional exhibition dealing with ways of destroying insects and weeds is being staged by Shell Chemicals Ltd. at the principal agricultural shows this summer. Photographs are used to show the extent of crop damage and the habits of common pests. Different forms of insect control are illustrated and information is given on the use of insecticides.

An independent section of the exhibition demonstrates the effectiveness of modern selective weed killers, and a mobile cinema is used to show colour films on plant pests and diseases.

Laboratory Furnishers' Merger

The Directors of Griffin and Tatlock Ltd., and of W. and J. George and Becker Ltd., in a joint statement issued on 29 June 1954, announce the merging of their two organizations under the name of Griffin and George Ltd. Their statement says that "pending the administrative and physical integration of our organizations, which will be a gradual process, we shall continue to trade, until further notice, under our existing names and at our present addresses".

Honeywell-Brown

Honeywell-Brown Ltd., announce the opening of an additional Glasgow office at 26 Blythswood Square, Glasgow.

Ocean Transport*

By E. H. THOMPSON†

The first barrelled cargo of oil from the U.S.A. to the U.K. was carried by the 224-ton brig *Elizabeth Watts* in 1861. Between 1869 and 1872 the sailing ship *Charles* was carrying oil between

Courtesy Nautical Photo Agency

The Lawhill.

the U.S.A. and Europe; she was fitted with 59 iron tanks giving a total capacity of about 750 tons, but this ship was not a tanker, as her cargo tanks were not an integral part of the hull or shell of the ship.

In the 1860's and onwards many sailing ships carried oil in barrels, or in cases, followed by quite different types of cargo. There was, for example, the *Thetis*, a two-masted schooner, made of wood and metalled, which was launched at Fowey in 1873. She was of 180 tons gross and on her maiden voyage carried clay in casks from Fowey to New York. In New York she then loaded over 6000 cases of petroleum for Salonica, earning a freight of £626. The master of the *Thetis* received £6 per month, plus gratuities, plus 10 per cent of the profits, while the mate received £5 5s. a month; the cook, £3 15s.; able seamen, £3 10s., and ordinary seamen, £2 10s. The total crew, including the master, was eight and the total wage bill for over six months

Courtesy Nautical Photo Agency

The Drumeltan.

amounted to just over £190. The master was allowed 1s. 1d. per day per man to feed his crew.

After the petroleum the *Thetis* carried barley, oranges, coals, pineapples, and then china clay. The modern tanker seems to lack flexibility.

1812 saw the building of the steam passenger ship, *Comet*, 1886 the launching of the steamer *Glückauf*, regarded as the prototype of the modern oil tanker, and 1888 the building of the *Standard*, the first tank steamer to be built in the U.S.A. It might, therefore, be imagined that ocean-going sailing ships quickly ceased to transport oil. In fact, the sailing ships continued to play a part in the business well into the 1900's.

The "Lawhill"

Sixty-two years ago the *Lawhill*, a steel four-masted barque of about 3000 tons gross, was built at Dundee. She was operated in the jute trade until 1899 when she was bought by the Anglo-American Oil Company, now Esso Petroleum, and operated in the cased oil business until 1911 when she was sold to a Liverpool firm. In 1914 the *Lawhill* was transferred to the Finnish flag and in 1919 bought by the late Capt Erikson. She remained the property of Capt Erikson until 1941 when, still under the Finnish flag, she was seized as a prize by the South African Government. The *Lawhill* carried on in the grain and other trades until 1948 when she was sold to a Portuguese Indian, but in 1950 this grand old ship went aground at Lourenço Marques, having dragged her anchors and, last year, she was sold to shipbreakers. In 1950 the South African Government announced its intention of giving £1775 to Capt Erikson's son, being the proceeds of the sale of the ship.

Courtesy Nautical Photo Agency

The Juteopolis.

The *Lawhill's* movements for 1906, when she was running for Esso, reveal that she left Cape Town on 3 July and arrived at New York on 20 August, a mean effective speed in the desired direction of just under six knots. She was then in New York 34 days discharging, undergoing repairs in dry dock, and reloading before leaving New York on 23 September for Cape Town, where she arrived 70 days later.

Another Esso sailing ship made the passage from Cape Town to New York in 39 days in 1907. This was the *Glendoon*, of 1981 tons, built in 1894.

The "Drumeltan"

The *Drumeltan*, an iron four-masted barque of about 2000 tons gross, was built in 1883. A few years later she was in the cased oil trade and remained in it until 1905. The movements record reveals that the *Drumeltan* left New York on 24 February and arrived at Brisbane on 8 June, a run of 104 days.

This lovely ship recalls some lines from John Masefield's "Ships":

> "These splendid ships, each with her grace, her glory,
> Her memory of old song or comrades' story,
> Still in my mind the image of life's need,
> Beauty in hardest action beauty indeed."

"Beauty in hardest action"—in an earlier age a great

*Paper read to the Institute of Petroleum, London Branch, 19 January, 1954.

†Marine Department, Esso Petroleum Co. Ltd.

Admiralty Secretary making a voyage with the fleet to Tangier in 1683 wrote this in his memorandum book:

> "Towards showing the hardship of the seamen's trade it is mighty observable the strange difficulties they suffer in the dark nights in storms when men must go up to hand their sails etc., in the night."

Two hundred years later it was still very true.

The "Juteopolis"

The steel four-masted barque *Juteopolis* of 2850 tons gross was built in 1891, and, like the *Lawhill* and *Drumeltan*, later acquired by Esso. Another sailing ship owned by the same concern was the *King George* which operated between Bayonne (New Jersey) and Hong Kong, Shanghai, and other Chinese ports. Captain William Tucker, who served on the *King George* from 1904 onwards, has recently described one of his voyages in these terms: "We carried about 120,000 cases (there were two five-gallon cans of oil per case) outward bound to the East and returned with Chinese matting, fireworks, and *notions*. A round trip took nine or ten months." The *King George* had a sorry end, going ashore south of Sumatra in 1909.

Courtesy Nautical Photo Agency

The Eclipse.

Esso Sailing Ships

Between 1900 and 1903 Esso had eight large sailing ships specially built in the United Kingdom for the oil trade. Two of these were the *Brilliant* and the *Eclipse*.

The steel four-masted barque, *Brilliant*, of 3765 tons gross, was built by Russell's of Port Glasgow in 1901 and cost about £54,000. With her sister ship, the *Daylight*, she was the largest four-masted ship in the world, having a length of about 350ft and

Courtesy Nautical Photo Agency

The Brilliant.

a breadth of 49ft. The specification for the building of the *Brilliant*, dated 1900, provided that the captain's room was to be "comfortably fitted up with berth (*i.e.* sleeping bunk), drawers, sofa with seat and back stuffed and covered with

The Glückauf.

Utrecht velvet, table, and chronometer stand, book-shelves, and washstand with enamelled top."

The mate had a room of his own but the second and third mates shared a room. All the rest of the crew were housed in a deckhouse, a space required by the specification to be "fitted with berths for crew, with teak skylight, and to have lockers and seats, the ventilation to approval of Board of Trade surveyors". Those who have inspected the very spacious and well-equipped officers' and crews' quarters of a large modern tanker will appreciate what a tremendous advance has taken place in the amenities provided.

The movements record for 1904-5 shows the *Brilliant* leaving New York on 31 July with oil in cases and arriving at Yokohama on 8 January, a passage of 161 days. In 1910 she was fitted at New York for the carriage of oil in bulk and continued to trade for the same owner until 1913.

The *Eclipse*, built by Rodgers in 1902, made the voyage from New York to Hong Kong in 107 days during 1905.

German Sailing Ships

The German sailing ship, *Andromeda*, is described by my German friends as "the first overseas tank ship of the world".

The Andromeda.

She was built in England but bought by the Germans who, in 1885, converted her into a tank ship at the Tecklenberg Shipyard at Geestemünde. The conversion increased her carrying capacity from 12,000 to 17,000 barrels. In 1888 the *Andromeda* stranded near Yarmouth, having made five trips and transported about 70,000 barrels of kerosine from the U.S.A. to Europe.

The *Glückauf* is also a famous tank steamer, built in England for the Germans in 1886. The *Glückauf* stranded on Fire Island near New York in 1893, and the wreck was sold for £2150.

The "Narragansett"

The largest oil-carrying ship of her day was the *Narragansett*, built in 1903 by Scotts at Greenock. Unlike the modern tanker her engines were amidships. She carried in her sixteen separate compartments 10,500 tons of oil. She was 531ft long overall, with a total deadweight carrying capacity of 12,000 tons on a draught of 27ft and a speed of 11 knots in service. She was coal-fired, but later converted to burn fuel oil. In March 1917 the *Narragansett* was sunk by an enemy submarine off the Scilly Isles leaving no trace of her officers or crew.

The first German motor-driven tanker was the *Hagen*, which was launched in 1912 and put into service in 1913. Compared with the old *Narragansett* the *Hagen* was not good to look at, and neither was the motor vessel *Narragansett*, which was an

The Narragansett.

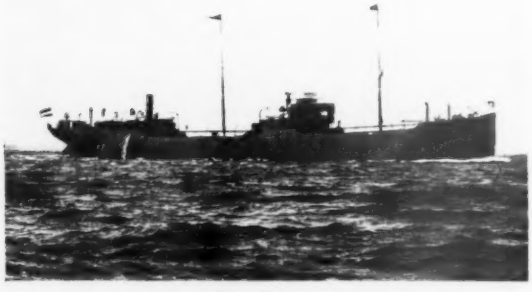
early large ocean-going British motor tanker, built by Vickers, Barrow, in 1920, but broken up in 1933.

"Iroquois" and "Navahoe"

The tank steamer *Iroquois* and the tank barge *Navahoe* were built for Esso by Harland and Wolff, Belfast, in 1907. The owners seem to have been reluctant to see the approaching end of the sailing ships and hit on a compromise, which was remarkably successful.

The *Iroquois* carried about 8800 tons of cargo (usually refined oil from U.S.A. Gulf ports to Purfleet) and towed the *Navahoe* which carried about 9250 tons (usually spirit from U.S.A. Gulf ports to Thameshaven).

The *Navahoe's* lines are certainly not those of a sailing ship, but she was rigged as a six-masted schooner. A steam winch was provided at each mast for hoisting the sails, which were always set as long as they would draw, but with a fair wind they were sometimes blown out of the bolt ropes before they could be taken in. The foremast of the *Navahoe* also acted as a funnel for the boiler which supplied steam to the towing winch, cargo pumps, and auxiliaries. The skippers of these ships were usually on



The Hagen.

Photo by H. R. Clayton Ltd.

The Esso Purfleet, a tanker of the T-2 class.

good terms, but used to "take the mike out of one another" by referring to "my barge skipper" or "my tugboat skipper" as the case might be.

Between March 1908 and May 1917 the *Iroquois* and *Navahoe* made 148 Atlantic crossings, usually U.S.A. Gulf to London with refined oil and spirit, at an average speed of 8.7 knots. In May 1917, the convoy system being in operation on the Atlantic crossing, the *Iroquois* and *Navahoe* were transferred to the U.S.A. Gulf to Halifax run, carrying fuel oil for the Admiralty at an average speed of 10.1 knots. In November 1918 both ships returned to the U.S.A. Gulf to London run, remaining until 1930 when the *Navahoe* became a storage hulk in the Caribbean area.

The *Iroquois* continued to run solo from 1930, but occasionally took special assignments in her stride, including the towing out

Photo by W. Ralston Ltd.

The Esso Oxford.

of the submarine pipelines at Tripoli and Haifa Bay in 1934 and at Mena Al Ahmadi in 1946. During the second world war her feats included the towage of a U.S. Navy dry dock from Honolulu to the South Sea Islands and of the tanker *San Gaspar* (a war casualty) from Trinidad to Key West.

The *Navahoe* ended her days when she was ceremoniously "buried at sea" in 1936 off Trinidad; the *Iroquois* was sold to U.K. shipbreakers in 1947.

Literature and Photographs

The literature dealing with sailing ships includes one book of

special interest, namely Lubbock's "Coolie Ships and Oil Sailers" published by Brown, Son and Ferguson. Basil Greenhill's "The Merchant Schooners", published by Percival Marshall, deals with the smaller sailing ships and is a fascinating book. So also is the volume entitled "Sailing Ships" published by H.M. Stationery Office.

The Nautical Photo Agency of Beccles, Suffolk, holds a very

By courtesy of R. W. Ellis

The Iroquois.

excellent stock of photographs of sailing ships and copies can be obtained in the form of postcards, etc., from the Agency. There is also a fine collection of photographs in the National Maritime Museum.

Recent Tanker Developments

Prior to 1930 few tankers were designed for speeds of more than 10 to 11 knots, and 11,000 to 12,500 tons was a normal size, although the *John D. Archbold* built in 1921 was of 22,600 tons deadweight and the *C. O. Stillman*, built in 1928, was of 24,000 tons deadweight. During the 1930's, designed speeds of 12 to 13 knots became common and sizes increased slowly with, occasionally, large ships such as the *W. S. Farish* and *G. Harrison Smith*, both built in 1930 and of 20,165 tons deadweight.

During the war years a huge fleet of tankers, known at T-2s, were built in the U.S.A. of about 16,500 tons deadweight and 15 knots.

By 1947 a number of so-called "super tankers" were on order, particularly in the U.S.A. A typical "super tanker" had dimensions of about 630ft in length and 82ft in breadth, its speed was about 16 knots and it had a loaded mean draft of 31½ ft. These

By courtesy of R. W. Ellis

The Navahoe.

ships, with a total capacity of about 26,000 tons, can receive cargo at an average rate of over 5000 tons per hour and are capable of discharging a full cargo of crude oil at an average rate of 3000 tons per hour, given appropriate shore conditions.

Since 1947, a considerable number of tankers ranging from 20,000 to 32,000 dwt have been built, but very much bigger tankers have now arrived. Many will have seen on Television Newsreel the tanker *Tina Onassis* which delivered her first cargo of crude oil recently at Thameshaven. She was built at Hamburg, is reported to have cost nearly two million pounds, is of 45,720 tons deadweight, and has a carrying capacity of about 44,000 tons at a speed of 16 knots. A slightly larger tanker, the *Phoenix*, of about 45,800 tons deadweight, was launched last October in Japan.

The *Tina Onassis* has a length of 722 ft between perpendiculars, a beam of 95 ft, and, when loaded to her summer marks, a mean draft of 37 ft 6 in—too great to allow her to come through the Suez Canal fully loaded. The liner *Queen Elizabeth* has a length of 987 ft between perpendiculars and a beam of 118 ft, so the *Tina Onassis* has a length roughly seven-tenths of that of the *Queen Elizabeth*, and a beam roughly four-fifths of that liner. These figures are mentioned because a comparison of say gross and net tonnage figures would lead to quite a different conclusion. The gross tonnage of the *Queen Elizabeth* is, for example, around 84,000 while that of the *Tina Onassis* is only 28,000 or one-third that ot the liner.

Tanker Personnel

Finally, what about the men who go to sea to-day in tankers under the Red Ensign? It is a specialized occupation requiring many years of training ashore and afloat, and demanding

By courtesy of R. W. Ellis

The Iroquois towing the Navahoe in heavy weather

marked ability and strength of character. It is important to remember that these men are an integral part of the British mercantile marine and their setting must be viewed against the background of the shipping industry generally and of the National Maritime Board and its Agreements in particular.

The objects of the National Maritime Board have been stated in the following terms: With a view to securing closer co-operation between the employers and employed of the British Mercantile Marine in the maintenance of the maritime supremacy of the British Empire, there shall be constituted a Board known as the National Maritime Board and District Panels for the purpose of:—

(*a*) The prevention and adjustment of difference between shipowners and masters, seamen, and apprentices;

(*b*) The establishment, revision, and maintenance of a National Standard rate (or rates) of wages and approved conditions of employment in the Mercantile Marine.

The National Maritime Board consists of a panel for shipmasters and five other panels for navigating officers, engineer officers, radio officers, sailors and firemen, and the catering

department. Each panel consists of 12 representatives of the shipowners and 12 representatives of the personnel covered by the particular panel. The National Maritime Board was established during the second world war and has been extraordinarily successful in securing its main object of co-operation between employers and employed.

The average strength of the British Mercantile Marine over the first six months of 1953 was estimated at roughly 144,000. The great majority of these men were, of course, engaged other than in tankers.

One of the many important National Maritime Board Agreements resulted in the creation, in 1947, of the Merchant Navy Established Service Scheme, the main object of which was: "to enable seafarers, after a qualifying period of sea service, to look to the Merchant Navy to offer them a stable and attractive career, and greater regularity of employment, and give shipowners efficient and reliable personnel to man and maintain their ships at sea and in port". This object is pursued by careful selection and a system of two-year service contracts.

A modern 26,000-ton tanker may have a crew totalling fifty. A master probably starts his career by attending a nautical school, and then serving four years at sea as an apprentice or cadet. A three-day M.O.T. examination for his second mate's certificate follows and, if successful, the young man goes back to sea, this time as a third mate. After 18 months' further experience at sea, as a watchkeeping officer, he should be ready to take his first mate's examination. If successful he will probably then return to sea as a second mate and, after a further 21 months watchkeeping experience and study, he may sit for his master's certificate. If successful he will hope to secure a first mate's job and, when he has gained more experience and maturity, a command. His employers will usually see that he attends courses dealing with radar, fire fighting, defence, etc. In a few cases an officer may elect to sit for his extra master's certificate after obtaining his master's certificate.

The chief engineer's career will have followed a different course. He probably started by serving a four-year apprenticeship in a marine engine works ashore, went to sea as a junior engineer and, after 18 months' study and experience as a junior watchkeeping engineer, sat for his second engineer's certificate. If successful, an engineer then goes back to sea as a third or second engineer and, after 18 months as a senior watchkeeping engineer, he can, if his general education and application to study has been good enough, pass his chief engineer's examination. This is followed, in a few cases, by the extra chief's examination. On obtaining his chief's ticket an engineer will usually go back to sea as a second engineer and, with more experience, will look forward to a chief's job.

There is now an alternative system for training young men wishing to become seagoing engineers. The scheme, which is intended to supplement the normal method of training by apprenticeship in heavy engineering, is that youths selected by shipowners at the minimum age of 16 take a specially-designed two-year full-time course for a National Diploma at a technical college. In vacations they have experience in workshops and after the two years course, go to sea for 18 months as engineer apprentices or cadets. They spend a final year taking a specially arranged course in an approved workshop ashore. The successful completion of the two-year National Diploma course secures exemption from Part A of the examination for the second engineer's certificate.

Working in a large modern tanker can be full of interest. It provides a very remunerative career, and extensive and frequent leave enables men to enjoy also many of the amenities of life ashore.

★ ★ ★

Personal Notes

R. E. Buell has been appointed controller of the Technical Division of the Regent Oil Co. Ltd. following the reorganization of Regent's technical services in the U.K.

Mr Buell was previously supervisor of the products section of the California Texas Oil Co., and has spent many years in technical and research work both in the U.S.A. and in Bahrain. He was engaged on wartime aviation installations with the Bahrain Petroleum Company before joining the Caltex Head Office Research and Development Division in New York.

Mr Buell is a member of the Society of Automotive Engineers and has been connected with the work of ASTM in the U.S.A.

Kenneth G. Mackenzie, Ph.D., M.S., F.Inst.Pet., has been unanimously elected to honorary membership of the ASTM in recognition of "especially meritorious service in both technical and administrative activities of the Society, and for notable support and achievement in research and developing standards for petroleum products'. He was secretary of ASTM Committee D-2 on Petroleum Products and Lubricants from 1913 to 1922 and vice-chairman until 1930. He is also an honorary member of the IP Standardization Committee.

H. R. Walton, sales manager of the Fisher Governor Co. Ltd., left London recently for a visit to the Middle East where he made a tour of petroleum companies in the Persian Gulf area. He was accompanied by G. F. Brockett, chief engineer of the Fisher Governor Company, Marshalltown, Iowa.

The Order of Istiqlal of the United Kingdom of Libya (Class 1) has been conferred on **E. A. V. de Candole**, C.M.G., C.B.E., head of the Department of Arab Affairs, Kuwait Oil Company, for his past services in Libya. He received the decoration from H.M. King Idris during a recent visit to Libya.

O. Lawson Dick, who was formerly editor of *Esso Magazine* and head of the Publications Division of Esso Petroleum Company, recently joined Public Relations Associates Ltd., as general manager and has now been appointed managing director of the firm. It has also been announced that Sir Stephen Tallents, founder president of the Institute of Public Relations, has joined the organization as a consultant.

Prof W. Wardlaw, C.B.E., F.R.I.C., has been elected President of the Chemical Society for the coming year.

★ ★ ★

SHELL-MEX AND B.P. APPOINTMENTS

Shell-Mex and B.P. Ltd. announce the following appointments:

K. W. Fidler to be communications manager, Head Office.

L. H. Ralph to be assistant manager, Staff Department.

C. S. Martin to be fuel oil manager, London Division.

H. C. Beaufoy to be branch manager, North Wales Branch, North Western Division.

A. E. J. Coburn to be manager, St. Leonards Wharf and Silvertown Installations, London Division.

D. H. M. Charles to be branch sales supervisor, Bristol Branch, Western Division.

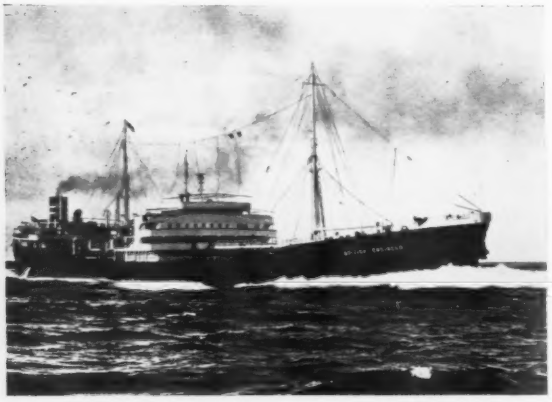
I. Brooke-Nicol to be publicity representative, London Division.

Notes of the Month

New Chemical Plant at Grangemouth

British Petroleum Chemicals Ltd. are to build a new chemical plant at their Grangemouth works for the production of alkylate, an industrial raw material of the type used in the manufacture of high grade detergents.

The new plant is expected to come into production during the latter half of 1955. Some of the raw material for the plant will be drawn from the nearby refinery of Grangemouth Petroleum Refinery Ltd.



An Anglo-Iranian photo

The oil tanker British Engineer *during her recent speed trials off the Isle of Arran, Scotland. She is the third of the* 32,000-*ton class tankers to join the fleet of Anglo-Iranian's British Tanker Company.*

Cathodic Protection Against Rust

A new anti-rust device has been developed which it is hoped will save millions of pounds a year in world shipping maintenance costs. It is known as the "cathodic protection" technique and has been further developed by F. A. Hughes and Co. Ltd. in collaboration with Shell.

Successful tests have been carried out in the oil tanker *Auris* during the past year and long-period trials under practical conditions have shown that by employing this technique the rate of corrosion is reduced by about 80 per cent.

In the "cathodic protection" technique an electrical current is applied to the metal of sufficient intensity to smother the inherent differences in electrical potential on the metal's surface. In oil tankers, magnesium anodes of special design and composition are permanently fitted in the cargo tanks and come into operation automatically as soon as the tanks are filled with sea water ballast.

The *Auris* tests have been applied to the cargo tanks, but "cathodic protection," in different form, also offers scope for hull preservation in all steel-built ships.

Tests are now being carried out on the hull of the *Shell Quest*, a converted merchant vessel which is serving as a depot ship aiding the underwater oil search in the Persian Gulf.

Tanker Sailings from Kuwait

The 10,000th tanker to sail with a cargo of bulk oil from Kuwait was loaded there early in June. The first shipment of oil from Kuwait was made eight years ago in June 1946.

Since that date there have been important changes in methods of tanker loading. At first tankers were loaded at submarine berths at comparatively slow rates, but in 1949 the oil pier at Mina al-Ahmadi was commissioned and as a result rates were greatly increased.

The pier can accommodate eight tankers at one time and there are also five submarine loading berths.

First Tankers Arrive at Aden Refinery

The first tankers to enter the oil port of Anglo-Iranian's new refinery at Aden arrived recently with a cargo of fuel oil for firing the refinery furnaces and the first supply of crude oil.

The two tankers were the 12,420-dwt *British Duke* and the 12,120-dwt *British Patriot*. Both vessels belong to Anglo-Iranian's British Tanker Company fleet.

Two company tugs had already arrived at the port and were used to bring the tankers into berth.

Expansion at Liège

Five new storage tanks, each with a capacity of 500 tons, have been built at the Shell liquid gas storage and filling installation at Wandre, outside Liège.

The installation now has a total capacity of 2700 tons and is equipped to meet the heavy summer demand for butane in Belgium.

There are three other Shell liquid gas filling stations in Belgium: at Ghent, Haren, and Jambes, and supplies are shipped to these centres in bulk lighters from the Pernis refinery at Rotterdam.

British Soldier

British Soldier, the fourth 32,000-dwt tanker to join Anglo-Iranian's British Tanker Company fleet, was launched by H.R.H. Princess Alexandra at Clydebank on 30 June.

The new tanker has been built by John Brown and Company and can carry an oil cargo of about 30,000 tons at a loaded service speed of 15 knots. Her overall length is about 665ft, breadth 85ft 6in, and she has a loaded summer draught of 35ft.

Road Bitumen Association

Major bitumen producers in the U.K. and industrial groups concerned with the uses of bitumen and allied materials in road construction and maintenance have joined together to form a Road Bitumen Association.

The chief aims of the Association are to promote research and other scientific work, and to give facilities for communication and interchange of views in connexion with bitumen and allied trades and industries.

The Association will co-operate with the Road Research Laboratory in the investigation of problems, and a programme of research is to be drawn up by a Technical Co-operative Committee.

Test Well at Granby

Drilling has begun at Granby, near Nottingham, where the D'Arcy Exploration Company, Anglo-Iranian's prospecting subsidiary, is continuing its search for new sources of oil in England. It is expected that the test well will be drilled to a depth of about 2500 ft.

Gasoline from Coal

The gasoline-from-coal synthesis plant which is being constructed in South Africa for the South African Coal, Oil, and Gas Corporation Ltd, is expected to be completed and in operation before the end of this year.

The project includes the mining of coal deposits to supply

7600 tons of raw material each day; gasification and reforming facilities to transform the coal into synthesis gas and by-product chemicals; and a complete synthesis plant which will produce liquid hydrocarbons, oxygenated hydrocarbon chemicals, and waxes.

Annual production of the plant when complete will include 55 million gallons of motor gasoline, 4.5 million gallons of gas oil, and nearly 1.5 million gallons of fuel oil. About 15 million gallons of industrial chemicals will also be produced each year.

The M. W. Kellogg Company has designed many of the process units for the new plant and the Kellogg International Corporation is in charge of all procurement and construction.

World Power Conference

A number of British delegates are attending the Brazilian Sectional Meeting of the World Power Conference from 25 July to 10 August 1954. The Government's official representative is the Rt. Hon. Lord Citrine, P.C., K.B.E., Chairman of the British Electricity Authority.

Among those attending the meeting are G. J. Gollin, Shell Petroleum Co. Ltd.; Dr A. Parker, C.B.E., Honorary Secretary of the British National Committee of the World Power Conference and Director of Fuel Research, DSIR; and R. G. Voysey of the Ministry of Fuel and Power.

Progress at Fremantle

Work is progressing ahead of schedule on the new oil refinery which is being built for the Anglo-Iranian Oil Company at Fremantle, Western Australia. The refinery will be Australia's first major processing plant and will supply the equivalent of nearly half the country's petroleum needs. It will include two 35,000 b.d. crude distillation units and a 12,500 b.d. orthoflow fluid catalytic cracking unit—the pedestal and reactor skirt of which are already in place.

Off-site facilities include an extensive laboratory area, a 1700-ft pre-cast concrete jetty to accommodate ocean-going tankers, and a pipeline to carry products from the refinery to a bulk loading station in Fremantle, 17 miles away.

The design and engineering work for the new plant is being carried out by The M. W. Kellogg Company and the erection work is under the supervision of the Kellogg International Corporation.

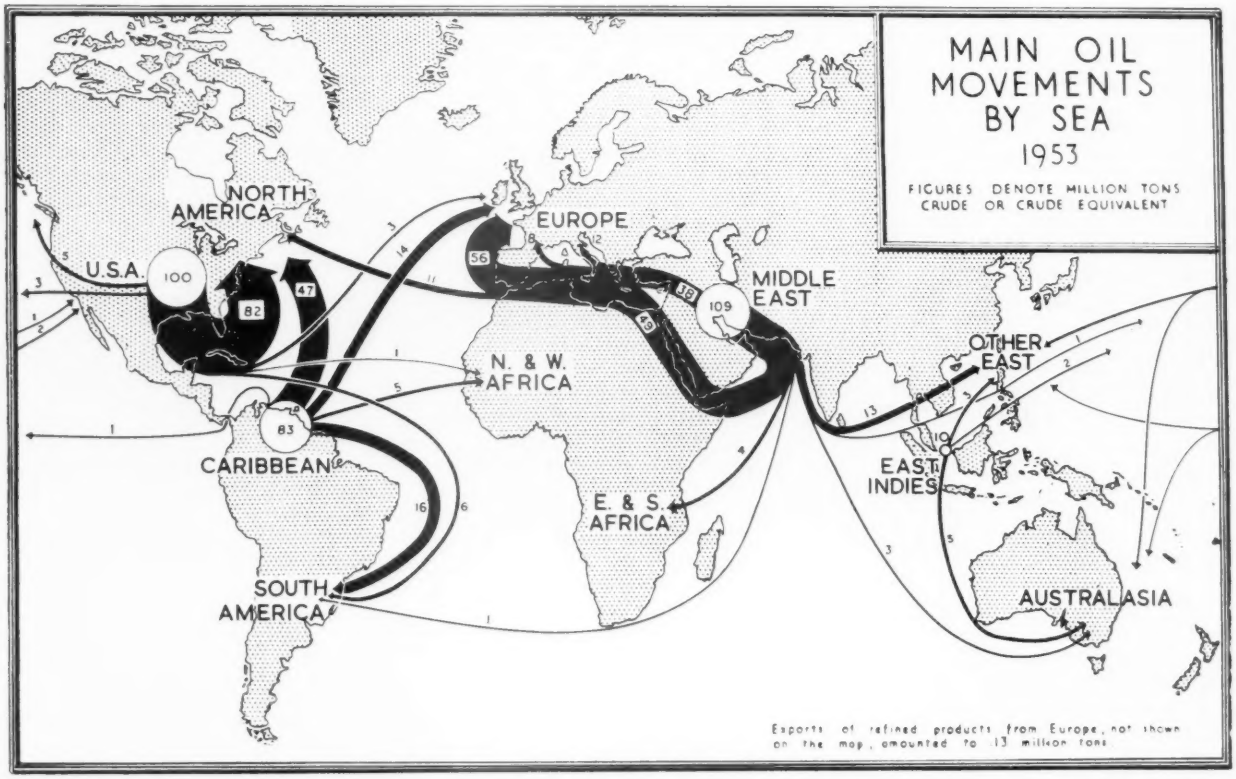
"Platformer" for Shell Haven

A "platformer," scheduled for completion late in 1955, is now being constructed at the Shell Haven oil refinery. The new plant will be able to produce some 240,000 tons p.a. of high-octane components for blending into premium quality petrol for London and surrounding markets.

This is the second plant of its type to be built by Shell in the U.K. The first is already in operation at Shell's Stanlow refinery.

British Industrial Solvents

The Distillers Company Ltd. and the Oronite Chemical Company of San Francisco, U.S.A., announce the formation of Orobis Ltd., a jointly owned company, now constructing a plant for the manufacture of lubricating oil additives at Hull. A complete range of lubricating oil additives as manufactured by Oronite in the U.S.A. will be manufactured and marketed by the new company. Facilities will include a fully equipped engine testing and customer service laboratory. It is expected that the plant will be in operation early next year.



The white circles on this map show the total shipments of oil from the four main producing areas during 1953: Middle East, U.S.A., Caribbean, and East Indies. The arrows show the destinations to which the oil was shipped and the respective amounts. Allowing for U.S. coastal shipments, and smaller movements not shown on the map, this international oil trade is estimated at 236 million tons in 1953, 35 per cent of the 666 million tons of oil consumed in that year. This map was prepared by the Anglo-Iranian Oil Company.

Marchwood Power Station

As reported in "Petroleum in Parliament" on page 158 of this issue, the British Electricity Authority's new 300,000 kW power station at Marchwood, Hampshire, is to be equipped for dual firing by oil or coal. It is expected to come into operation during 1956.

An agreement is to be concluded between Esso Petroleum Company Ltd., and the B.E.A. for an estimated quantity of 350,000 tons of fuel oil to be supplied annually direct from Esso's Fawley refinery, six miles from Marchwood. The rate of consumption could ultimately reach a figure of nearly 600,000 tons of oil, equivalent to an annual saving of approximately one million tons of coal. Supplies of oil to Marchwood will be transported by water from Fawley.

The only other major power station at present operating on oil is Bankside, in London.

Sui-Karachi Pipeline

The Government of Pakistan has recently announced that a 16-inch pipeline is to be laid from Sui to convey natural gas to Karachi, first to supply industrial undertakings and later for domestic users. The initial supply is estimated at 37 million cubic feet daily, to be increased after four years to 54 million, and by 1964 to 118 million.

For the protection of this 350-mile line Fibreglass Ltd. have secured an order for ten million square feet of anti-corrosion pipe wrap. Messrs D. Andersons & Sons Ltd. have also obtained an order for three million square feet of Thermoglas.

* * *

THE WORLD PETROLEUM CONGRESS TRAVEL ARRANGEMENTS

The British National Committee, in conjunction with their travel agents, Messrs Thomas Cook & Sons Ltd., are arranging special facilities for travel to Italy for the 4th World Petroleum Congress. Special reduced charges will be available for British members attending the Congress.

These arrangements will cover both outward and return journeys by train or by air and will provide the same standard of comfort as the equivalent normal services.

It is hoped that details will be finalized shortly and that full information will be published in our next issue.

* * *

CRUDE OIL PRODUCTIONS

	April 1954 *Tons*	*Jan.-Apr.* 1954 *Tons*
Qatar Petroleum Co. Ltd.	376,084	1,497,926
	May 1954 *Tons*	*Jan.-May* 1954 *Tons*
Iraq Petroleum Co. Ltd.—Kirkuk .	1,994,473	9,536,092
Basrah Petroleum Co. Ltd.—Zubair .	390,347	1,686,234
Mosul Petroleum Co. Ltd.—Ain Zalah and Butmah	111,857	538,098
Qatar Petroleum Co. Ltd.	383,308	1,881,234
Kuwait Oil Co. Ltd.	3,925,251	18,256,123

SITUATIONS VACANT

Applications are invited by the **Vacuum Oil Company Limited** for the following positions at its new refinery at Coryton, Essex:

Assistant Engineers—Applicants must have a Mechanical Engineering degree and experience preferably in either the petroleum or chemical process industry. However, applications from graduates who have recently left university will be considered. (Ref. A.E.)

Piping Draughtsmen—Applicants for this position must have piping layout experience in petroleum or chemical process plants. (Ref. D.M.P.)

General Draughtsmen—Wide engineering experience, particularly with reference to civil engineering, is required for this position. (Ref. D.M.G.).

All Draughtsmen applicants must have an O.N.C. and preference will be given to those who are studying for or have obtained an H.N.C. Salaries are progressive and opportunities for promotion excellent. Conditions of employment include a Pension and Life Assurance Scheme, Sickness Benefit Plan, and Sports and Social Club. Applications giving full details of qualifications and experience and quoting the appropriate reference should be addressed to the Industrial Relations Superintendent, Vacuum Oil Company, Limited, Coryton Refinery, Coryton, Essex.

An experienced, **qualified Engineer** about 42 to 52 years of age, is required to fill a highly responsible position in the Engineering Division of the **Vacuum Oil Company's Coryton Refinery.** The successful candidate will be appointed, either as Engineering Division Superintendent or Assistant Engineering Superintendent, depending upon his qualifications and experience. Either position calls for an Engineer fully conversant with the Engineering requirements of a modern operating and expanding refinery, capable of handling Senior Civil, Mechanical and Electrical engineers, coupled with the control of a Drawing Office and Corrosion and Inspection Groups. The work entails the handling of day to day engineering problems, but not maintenance work, associated with a large industrial Power Station with Steam and Electrical Distribution Systems. The handling of a construction programme and Contractors would fall within his province, also the Engineering aspects of all Refinery equipment associated with the production of a complete range of lubricating oils and atmospheric products. The successful applicant will be eligible for consideration in obtaining the tenancy of certain houses available to the Company. Conditions of employment include a Pension and Life Assurance Scheme, generous sickness plan and other benefits. Applications, giving full details of qualifications and experience and quoting reference "S.P.E.", should be addressed to the Industrial Relations Superintendent, Vacuum Oil Company, Limited, Coryton Refinery, Coryton, Essex.

Anglo-Iranian Oil Company Limited require a **Training Superintendent** for their modern Petroleum Refinery in KENT. Responsibilities will include supervision of: Apprentice Training at all levels; Job Training in Crafts and Process Work; Supervisor Training; and Further Education. The successful candidate must be a corporate member of a recognized professional body, and preferably a University graduate. He must have a successful record in Industrial Training, though not necessarily in all the branches listed above, and must be capable of applying Training Method to a wide field of activities. The Training Superintendent will work in conjunction with Training Officers in other establishments of the A.I.O.C. group of Companies. Salary according to qualifications and experience. Apply Manager, Recruitment Branch, Box 6782, c/o 191 Gresham House, E.C.2.

Engineering Firm in S.E. London engaged in plate work fabrication, with special emphasis on heavy chemical plant, requires a **Senior Engineer,** aged 30-45 years. Applicant should have a sound knowledge of modern engineering practice with some executive experience. Applicants should apply, stating age, experience, and salary required to *IP Review* Box No. 1084.

Manager required for **Orobis Limited,** manufacturers of special lubricating oil additives, a Company jointly owned by The Distillers Company Limited and the Oronite Chemical Company of San Francisco, U.S.A. Age 30-45. Science degree preferred but not essential. Candidates must, however, have a wide practical up-to-date knowledge of lubricating oil technology, including automotive lubrication and formulations with additives and engine testing practice. Sales experience in this field will be considered as an important asset. Applications must have sales ability and aptitude for administration, personality and tact being essential. No detailed knowledge of Company practice or accountancy is necessary, but practical experience of cost control will be an advantage. Enthusiasm is an essential qualification. Salary according to experience, but no candidate who cannot command £1,500 a year or more need take the trouble to apply. The successful candidate will be expected to live in the London area. Please write to the Personnel Manager, British Industrial Solvents, Devonshire House, Mayfair Place, Piccadilly, London, W.1.

Petroleum Engineer required by British Oil Company for its operations in Trinidad, B.W.I. Salary according to qualifications and experience. Provident Fund. Apply to *IP Review* Box No. 1085.

spence catalysts
Activated Alumina and mixed catalysts, manufactured to customers' individual research and production requirements, form a regular part of the Spence catalyst service. Further details may be obtained on request.
SPENCE
PETER SPENCE & SONS LTD . WIDNES . LANCS .
ALSO AT LONDON AND BRISTOL

5041

STRUCTURES IN STEEL

We Specialise in
ALL TYPES OF STRUCTURES
Required for
Oil Production and Refining

ALSO
'KELVIN' *all iron* and 'MAINSTEEL' PALISADING
and All Types of FENCING
for HOME and OVERSEAS

A. & J. MAIN & COMPANY LIMITED

LONDON OFFICE
VINCENT HOUSE, VINCENT SQUARE, S.W.1
Telephones: Victoria 8375 6 7 8 *Telegrams:* Kelvin Sowest, London

WORKS AND REGISTERED OFFICE
CLYDESDALE IRONWORKS, POSSILPARK GLASGOW, C.2
Telephone: Possil 8381 *Telegrams:* Kelvin, Glasgow

CALCUTTA: Post Box 36, 16 NETAJI SUBHAS ROAD
also NAIROBI and CHITTAGONG

Price of Shield, including postage: 26/10d. Size: 7" × 6"

Catalogues sent on request

PIGGOTT BROTHERS & COMPANY LIMITED

- *Makers of Tropical Kit and Equipment*
- *And all classes of Canvas Goods*

SUPPLIERS OF THE INSTITUTE CREST, AND ALL OTHER SCHOOL, REGIMENTAL AND COLLEGE COATS OF ARMS

220-226, BISHOPSGATE, LONDON, E.C.2.

These flies are guinea-pigs

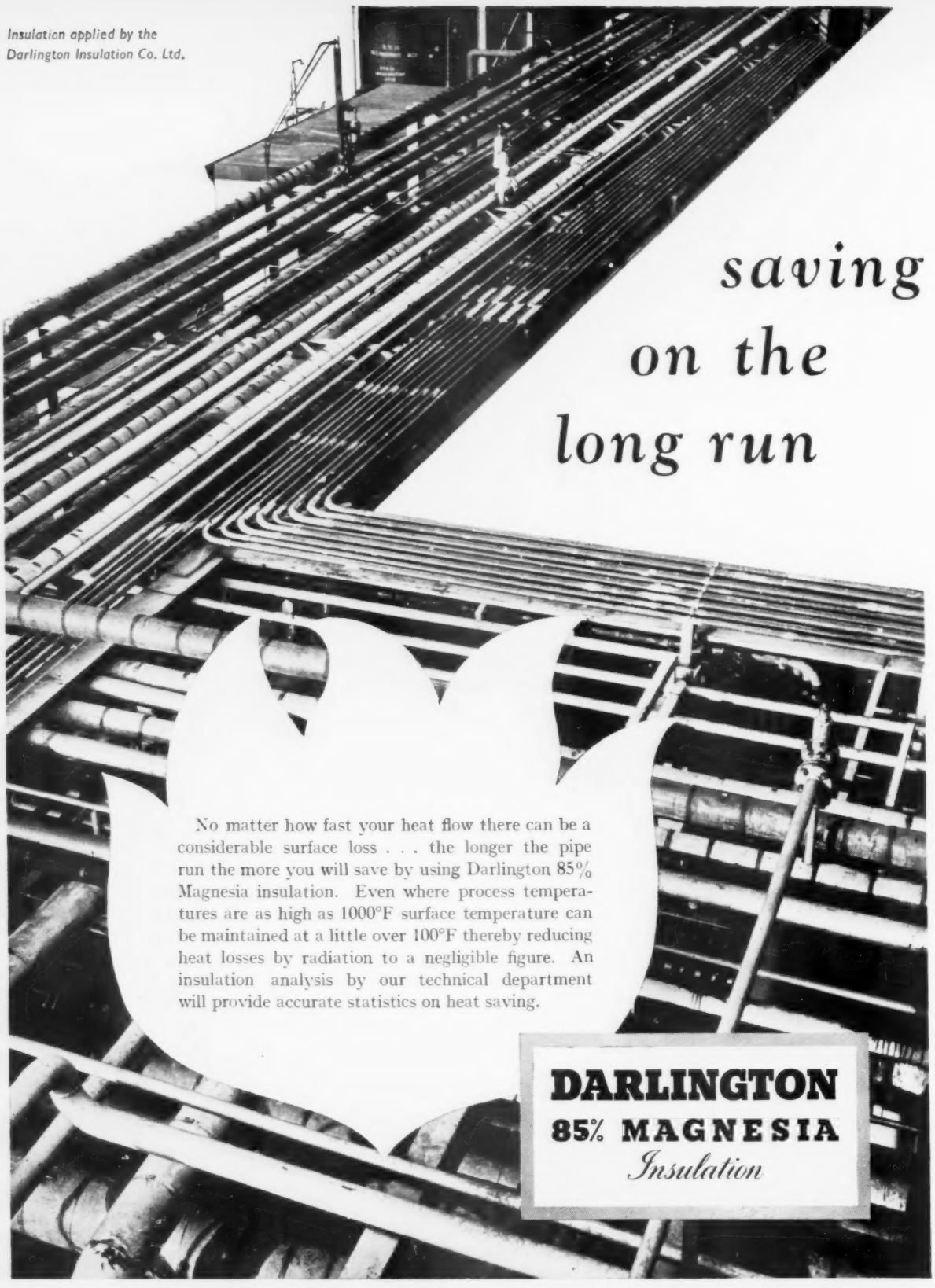
A FLOURISHING FLY FARM exists at Anglo-Iranian's Sunbury Research Station. These flies are guinea-pigs; used to measure the effectiveness of insecticides.

Developing more deadly fly-killers is but one small item among Anglo-Iranian's many activities. Others? Producing and shipping over 32 million tons of oil a year. Distributing the products of oil all over the world. Seeking oil for the future in places as far apart as England and New Guinea.

With refineries in seven countries and a fleet of tankers that totals nearly 2,000,000 d.w. tons, Anglo-Iranian is a major force in the world oil industry.

THE BP SHIELD IS THE SYMBOL OF THE WORLD-WIDE ORGANISATION OF

Anglo-Iranian Oil Company
LIMITED



Insulation applied by the Darlington Insulation Co. Ltd.

saving on the long run

No matter how fast your heat flow there can be a considerable surface loss . . . the longer the pipe run the more you will save by using Darlington 85% Magnesia insulation. Even where process temperatures are as high as 1000°F surface temperature can be maintained at a little over 100°F thereby reducing heat losses by radiation to a negligible figure. An insulation analysis by our technical department will provide accurate statistics on heat saving.

DARLINGTON
85% MAGNESIA
Insulation

Manufacturers : **THE CHEMICAL & INSULATING CO. LTD. DARLINGTON**

Insulation Contractors :
THE DARLINGTON INSULATION CO. LTD., Newcastle upon Tyne

Sheet Metal Fabricators :
S. T. TAYLOR & SONS LTD., Team Valley, Gateshead

No standing still

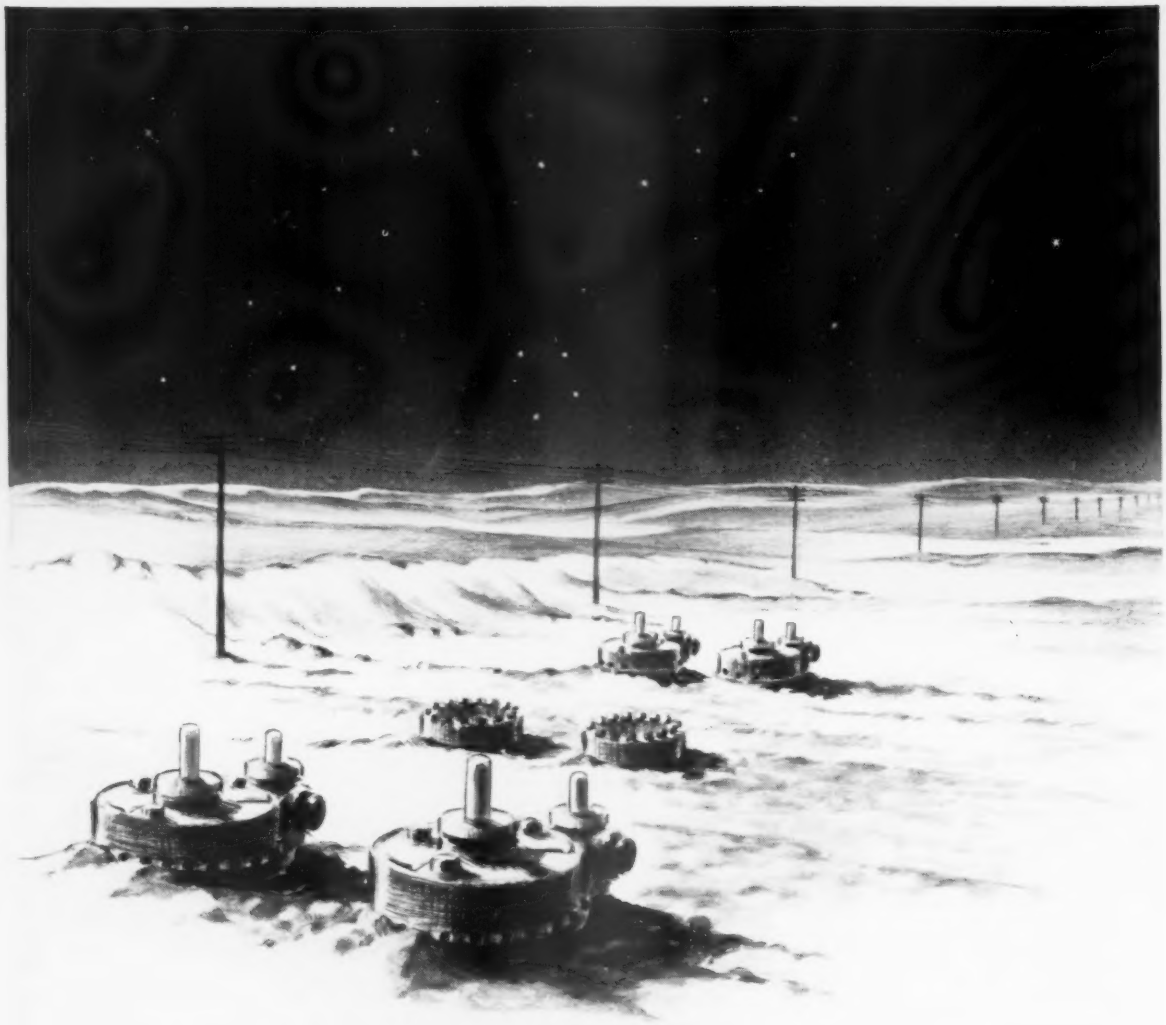
Under to-day's conditions, the price of uncertainties, fumblings and second attempts is prohibitive at any stage, and nowhere more certainly so, than in plant erection. It requires a wide, practical experience of process engineering for the petroleum and petro-chemical industries — like that possessed by D. & C. and William Press Ltd. — to ensure that operations keep abreast of to-day's development tempo.

D & C
AND WM.
PRESS
LTD.

civil, mechanical and chemical construction engineers at home and abroad

Head Office: **27 ASHLEY PLACE, LONDON, S.W.1.** Tel: VICtoria 9751 (6 lines). Grams: Demcopress, London

T.A.6245



Sentinels in the desert

These are not mines found in the desert after the last war, but the operating gear units of four 16″ Class 600 Hypreseal Valves on one of the major Middle East crude pipelines. The valves are seen here with the sheet steel protecting hoods removed: these hoods are locked round the gear units for protection against sand and dust, and against light-fingered or over-inquisitive attention.

The valves are of Lubricated Taper plug design, with inverted plug; 16″ Class 600, Cast Steel, full area, for stipulated working pressures up to 1,000 p.s.i.; double reduction worm gearing to provide slow closing; welding neck ends.

AUDCO
Lubricated
VALVES

Audley Engineering Co. Ltd., Newport, Shropshire.

ATMOSPHERIC AND VACUUM DISTILLATION UNITS

COMBINED DISTILLATION, CRACKING, REFORMING AND VAPOUR PHASE TREATING UNITS

PRESSURE DISTILLATE RE-RUN UNITS

GASOLINE RECOVERY AND STABILISATION UNITS

FRACTIONATING COLUMNS AND TUBE STILLS

WAX REFINING, SWEATING AND MOULDING

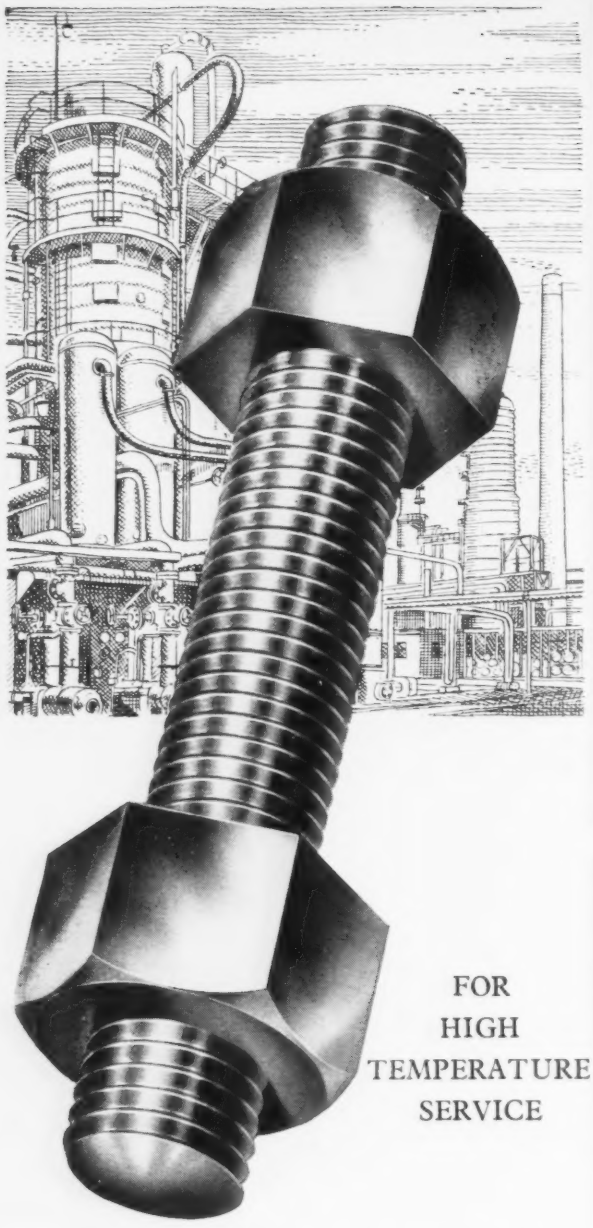
A. F. Craig & Company Limited

Caledonia Engineering Works

Paisley, Scotland

London Office: 727 Salisbury House, London Wall, E.C.2. Phone: NATional 3946

C 11



FOR
HIGH
TEMPERATURE
SERVICE

Conforming to B.S.S. 1750-1951, Stud Bolts and Nuts are being supplied by Rubery Owen to all the principal Oil Companies and Refinery Equipment Manufacturers in ever increasing quantities. Special production facilities have been planned to suit every requirement to both British and American Standards with either Unified or Whitworth Threads.

RUBERY OWEN

STUD BOLTS AND NUTS

RUBERY, OWEN & CO., LIMITED
DARLASTON, SOUTH STAFFS, ENGLAND

Member of the Owen Organisation

London Export Department: Kent House, Market Place, Oxford Circus, W.1
Canadian Office: 1470, The Queensway, Postal Station N, Toronto, 14

STANDARD METHODS

FOR

TESTING PETROLEUM

AND

ITS PRODUCTS

(THIRTEENTH EDITION-1953)

755 pages 168 Diagrams

Price 40s. post free

Obtainable from

The Institute of Petroleum
26 Portland Place, London, W.1

ASTM—IP PETROLEUM MEASUREMENT TABLES

Prepared jointly by the Institute of Petroleum and the American Society for Testing Materials, these standardized tables will be of incalculable benefit to all concerned with the measurement of petroleum products.

The Tables are available in three editions, viz:

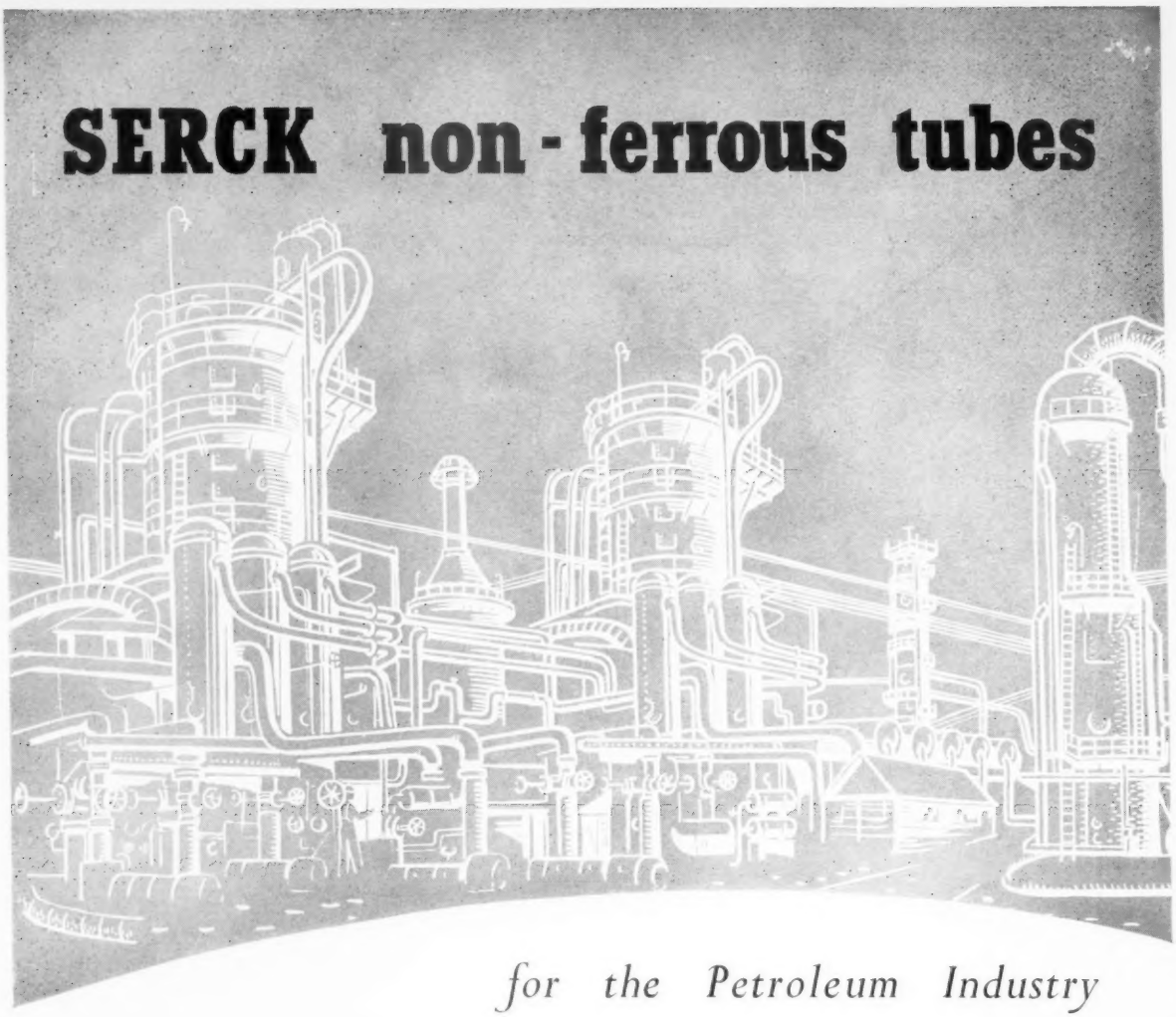
American (U.S. units of measurement)	Price 63s. ($8.75)
British (Imperial units of measurement)	Price 50s. ($7.00)
Metric (Metric units of measurement)	Price 55s. ($7.70)

and are obtainable from

American Society for Testing Materials
1916 Race Street
Philadelphia, Pa., U.S.A.

Institute of Petroleum
26 Portland Place
London, W.1

SERCK non-ferrous tubes



for the Petroleum Industry

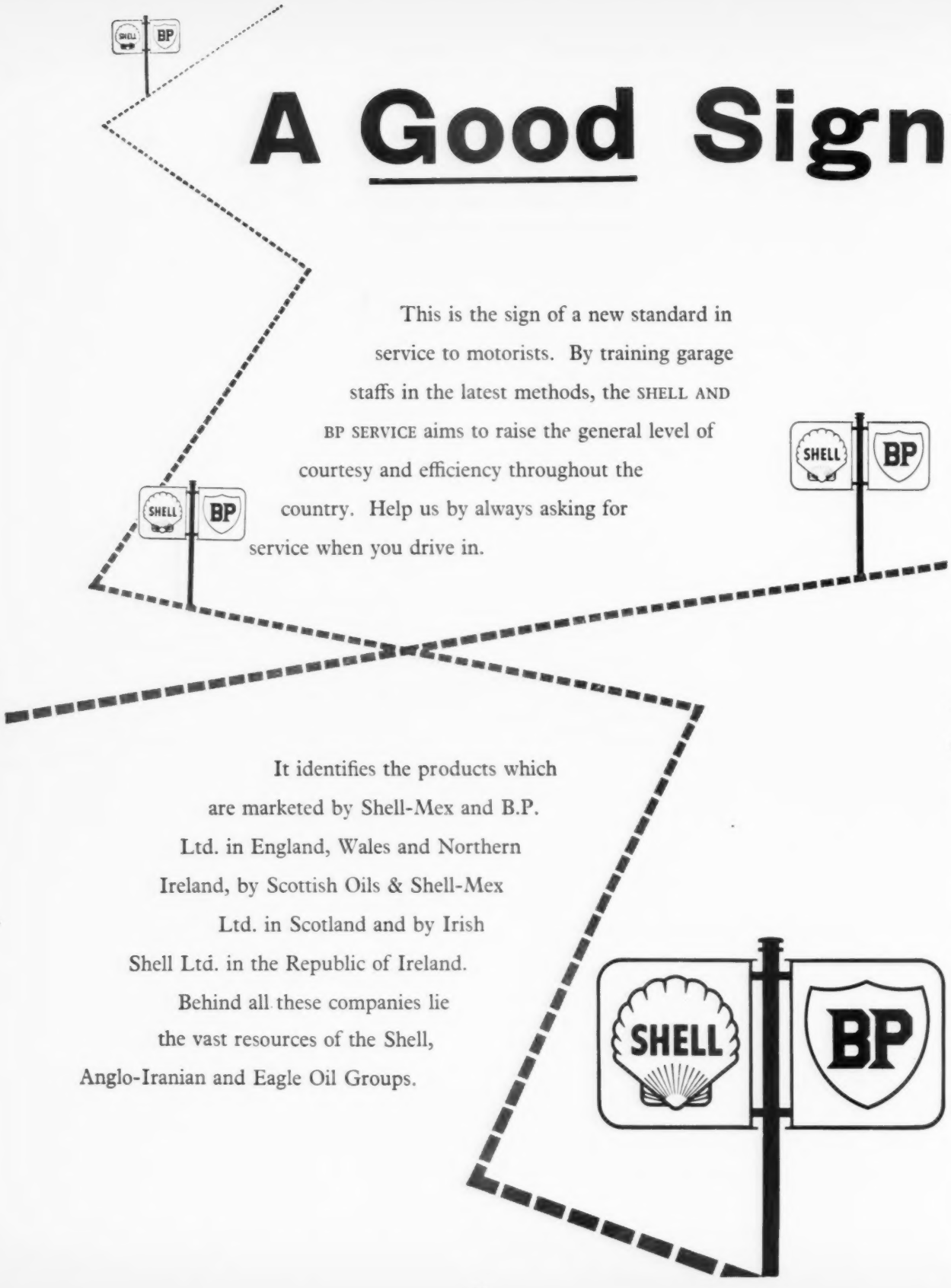
With the expansion of foundry facilities by the installation of the latest induction melting plant, the development of a specialised vertical extrusion process and the recent completion of a new tube mill—one of the largest and most up-to-date of its kind in this country today—Serck are able to offer a greatly increased tonnage of non-ferrous tubes.

The range of tubes includes 70 30, Admiralty brass, Aluminium bronze, aluminium brass and cupro-nickel made to British, American or other accepted specifications. The alloys are compounded to give the highest resistance to corrosion and eliminate de-zincification. Also every tube is individually tested hydraulically to 1,000 lb sq. in. or higher pressures as specified.

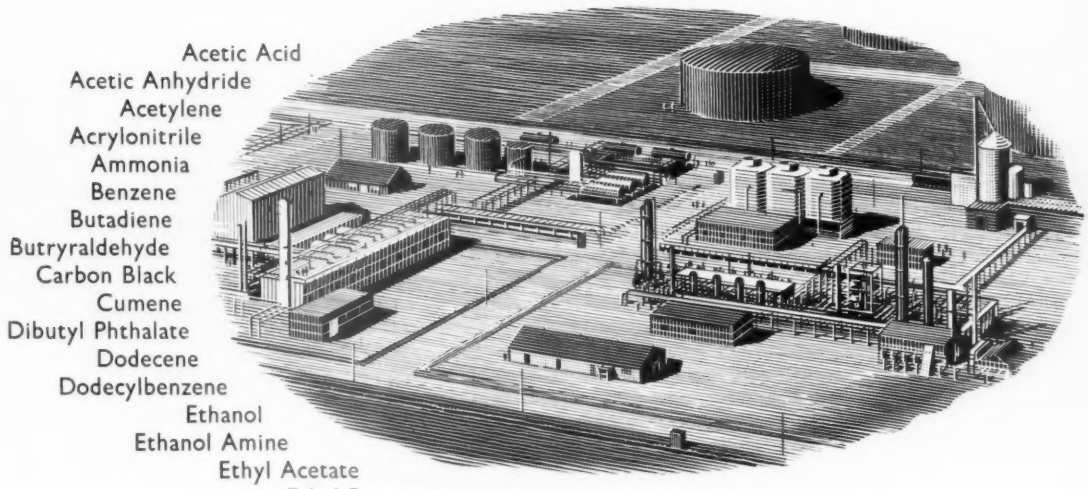
Stringent laboratory tests, rigid supervision throughout all stages of manufacture, and heat treatment in a controlled atmosphere ensure that Serck tubes will give long, trouble-free service.

Serck technical advisory service is always ready to help you select the tube best suited to your requirements.

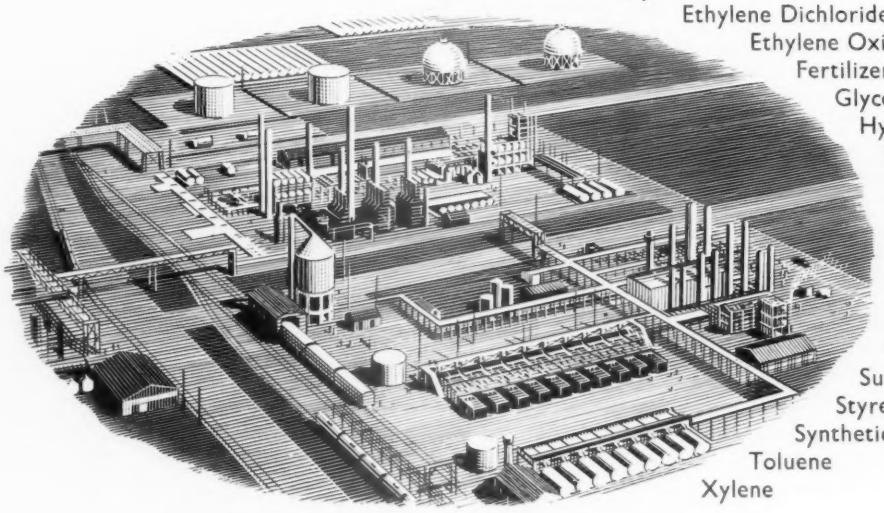
SERCK TUBES LIMITED . BIRMINGHAM 11


SHELL
BP
A Good Sign
This is the sign of a new standard in service to motorists. By training garage staffs in the latest methods, the SHELL AND BP SERVICE aims to raise the general level of courtesy and efficiency throughout the country. Help us by always asking for service when you drive in.
SHELL
BP
SHELL
BP
It identifies the products which are marketed by Shell-Mex and B.P. Ltd. in England, Wales and Northern Ireland, by Scottish Oils & Shell-Mex Ltd. in Scotland and by Irish Shell Ltd. in the Republic of Ireland. Behind all these companies lie the vast resources of the Shell, Anglo-Iranian and Eagle Oil Groups.
SHELL
BP

CHEMICALS AND PETROCHEMICALS



Acetic Acid
Acetic Anhydride
Acetylene
Acrylonitrile
Ammonia
Benzene
Butadiene
Butryraldehyde
Carbon Black
Cumene
Dibutyl Phthalate
Dodecene
Dodecylbenzene
Ethanol
Ethanol Amine
Ethyl Acetate
Ethyl Benzene
Ethyl Chloride
Ethylene
Ethylene Dichloride
Ethylene Oxide
Fertilizer
Glycol
Hydrogen Cyanide
Isopropanol
Maleic Anhydride
Methanol
Nitrotoluene
Phenol
Phthalic Anhydride
Propylene
Sodium
Sulphur
Styrene
Synthetic Rubber
Toluene
Xylene



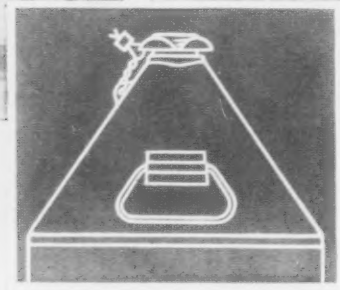
The products listed on this page are typical of those made in the plants designed by Badgers for the chemical and petrochemical industry.
Badgers offer complete engineering services based on a wide background of British and American experience.

E. B. BADGER & SONS LIMITED

Affiliated with STONE & WEBSTER ENGINEERING CORPORATION, Badger Process Division, U.S.A.

99 ALDWYCH, LONDON, W.C.2

***Process Engineers** and Constructors for the Petroleum, Chemical and Petro-Chemical Industries*



1¾" Screw cap, perforated on rim for wire sealing to lug on cone; drop handle located for ease of handling and pouring.

The SQUARE TAPER
– for easier handling

The Square Taper is designed for the easier handling of oils and similar liquids. Accurate pouring results from the tapered top which obviates in most cases the need for special adapters. The drop handle on the side of the cone facilitates control of the container when decanting; in addition, it reduces the risk of damage in transit and permits of easier access when lifting.

METAL CONTAINERS

METAL CONTAINERS LTD., 17 WATERLOO PLACE, PALL MALL, LONDON

WORKS: ELLESMERE PORT & RENFREW. ASSOCIATED COMPANIES OVERSEAS